TOOLING & PRODUCTION Magazine

APRIL 1958

Easy Way to Bore Heavy Parts
by W. E. Hoffman
It's all in the fixturing, when boring 5000 lb/counterweight-steering housings 71

Application and Maintenance of Carbide Twist Drills
by Frank W. Curtis
Use and maintain standard drills for maximum output and cleanest holes 75

Charts for Determining Milling Cutter Approach and Runout
by W. O. Becker
Save time in estimating by eliminating milling formula computations 80

Attaching Carbide Tips to Steel Bodies
by Frank E. Montie
Soldering, adhesive bonding, brazing, and new fusion methods are surveyed 83

Contract Stamper Produces Complete Assemblies
by Howard Nieberding and Carl F. Benner
With adequate facilities, contract stamper can assemble parts such as the brake backing plate described 87

Spotlight on Philadelphia and the Tool Show
Featuring the plants, conferences, products, and exhibits that make up the Tool Show 96

Cold Working of Metals . . . . . *D. J. Davis* 8

A Tool Makers' Square by D. B. & S. . . . *E. W. Pennington* 69

Electronic Actuator Controls Grinding to Millionths 91

Transfer Presses Important for Making Air Springs 93

Products at the Tool Show 100

Automotive Air Ducts 182

Departments in this Issue

Coming Events 6

New Films 26

Commendable Comments . . . 34

Book Reviews 44

New Plants & Growing Ones . . 48

Newly Appointed Reps 56

Calling Cards 64

Manufacturing Memos 66

Shop Aids 128

Products on Parade 132

Helpful Literature 169

SHORT RUN AUTOMATION

by Hughes Aircraft and Kearney & Trecker—a picture story—pages 94 and 95

Soft spot for old machines ?

Soft spot in profits too?

Talk to

Snyder

TOOL AND ENGINEERING COMPANY

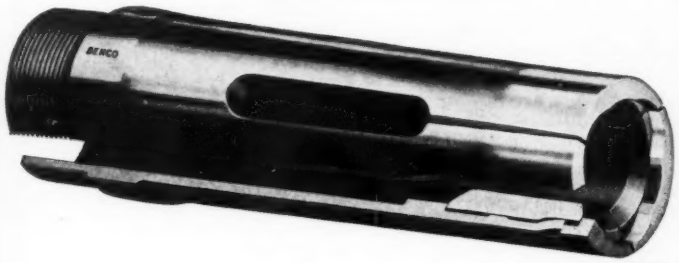
3400 E. Lafayette, Detroit 7, Michigan

Special Machine Tools with Automation for More Than 30 Years

PROVEN LONGER LIFE
PROVEN BETTER PRODUCTION

BENCO

model "A" master pushers with carbide pusher pads



You get more and better output with Benco Model "A" Master Pushers and carbide pads. Production runs in excess of 5,000,000 pieces have been achieved without changing pads or loss of tension of pushers.

Designed with "rocking ridge" in the pad recess, the Model "A" Master Pusher permits the pads to adjust themselves to full bearing on the stock. Thus scoring of the stock is avoided and feeding becomes more accurate. You will reduce your cost and get better production with Benco Model "A" and carbide pusher pads because no wear appears on the feed pad, therefore, no change in tension results and pusher troubles are eliminated.

For long life, for unmarked stock, Benco carbide pusher pads will far exceed the performance of any similar tool. The extremely low prices of carbide pusher pads will be returned to you many times in the savings they effect. You simply can't afford to be without them. For your short run jobs, very inexpensive pads are available for these master pushers in bronze, cast iron, hardened steel and meehanite.

Most sizes of Solid and Master Pushers, Solid and Master Collets for all popular automatics will be delivered immediately from stock. Send for price list and catalog.

BENCO COLLET manufacturing company

Cleveland 14, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 3

New Tools for Miniaturization... Companion Tools for Micro-Drills

L&I announces a new line of miniature reamers which are standard in sizes from #80 (Wire Gage .0135) through #61 (Wire Gage .0390). These reamers are perfectly engineered miniatures of L&I larger straight shank straight flute reamers, ground from the solid. They are provided with end relief and are made to a tolerance of +.0002", −.0000"! They are also available in intermediate decimal sizes. A complete set of 20 reamers is also ready.

See your L&I Distributor now, or write for his name.

L&I

"the reamer specialists"

LAVALLEE & IDE, INC.

CHICOPEE, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

APRIL 1958
VOL. XXIV—No. 1
GEORGE J. HUEBNER, Founder

PERSONALLY SPEAKING

Dear T&P Reader:

The ASTE Show will be held in Philadelphia beginning May 1, and it will run through May 8. Because many of you will have already left for the show before you could have received your May issue of T&P, our editors decided to feature the Tool Show in this April issue.

We have given you a run-down on the show and related activities, including a list of the technical papers to be presented as well as the time schedules and locations. Also, our hardworking editors have compiled a brief list of some of the interesting manufacturing plants in the Philadelphia area. I hope you will take a good look at this information before you go to Philadelphia. It will be a handy reference for you.

Of course, the products to be shown will also be listed in a special section called "Tool Show Previews." We tried to give you a preview of just as many products as we possibly could in the allotted space. And, we have done this without affecting the regular features and make-up of T&P.

We hope you'll have a pleasant and a profitable visit to the ASTE Show this year. Good luck and happy traveling.

About this time of year (after the back of Winter is badly bent, if not broken, and the crocus lovers are getting set to watch for the first green shoot) we get a rash of communications of all sorts from our readers. These are not just letters but include articles and papers on many facets of metalworking manufacturing.

There's a theory in our shop about this. We think that many of our readers are so confined during Winter that they simply have to "bust out" before Spring actually arrives. And one form this "busting out" process takes is getting some ideas down on paper. The theory may be wrong, but we are always glad when we get a lot of your ideas in our shop. Some are new and very well explained; some are not so new and perhaps not so clearly written. Of course, the job of getting industry writers to express themselves clearly is a very important part of our editors' work (those same hardworking editors mentioned above).

There are many ways to go about presenting your ideas to the editors of an industry magazine like T&P. Sticking out my long neck, I would like to discuss this with you in this column in a month or so. I hope I can be helpful. If you can use just one suggestion, it might help you to get your new idea into print quickly. It also might help to spread your techniques and methods throughout American industry to the betterment of our entire economy. Who knows?

Cordially yours,

Ray Huebner

Publisher

READERSHIP RESEARCH BPA

Editorial Staff:
E. Willard Pennington, Editor
Watson N. Nordquist, Managing Editor
Carl F. Benner, Associate Editor
William E. Hoffman, Associate Editor
Carol E. Reuss, Associate Editor
Jeannette C. Traendly, Assistant Editor
Ernest J. Urbas, Contributing Editor
Nyles V. Reinfeld, Contributing Editor

Business Staff:
R. L. Huebner, Publisher
C. A. Hurt, Assistant Publisher
P. E. Hager, Production Manager
E. J. Brooks, Art Director
B. C. Jackson, Research Manager
Mary Yoshida, Contract Manager

Editorial and Business Offices: 1975 Lee Road, Cleveland 18, Ohio, FAirmount 1-4040
Printing Office: 112 E. Chestnut Street, Louisville 2, Ky. (For Plate Shipments Only)

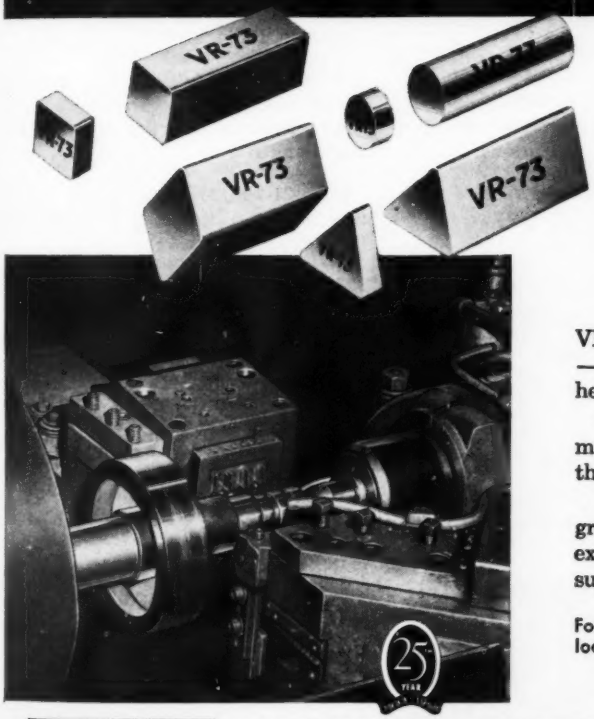
Published Monthly by HUEBNER PUBLICATIONS, INC.
R. R. HUEBNER.....Chairman, Secretary, Treasurer
RAY L. HUEBNER.....President GEORGE J. HUEBNER, JR.....Vice President

Copyright by Huebner Publications, Inc., 1958. Accepted as Controlled Circulation Publication at Louisville, Ky. Single copies $1.00 each. U. S. subscription rate $2.00 per year for metalworking plant operating executives and department heads. All other subscriptions $6.50 per year. All foreign subscriptions, $10.00 per year.

LOOK

Here's your answer to machining "Superalloys"

VR-73



A Superior Steel-Cutting Cemented Carbide

- **Hardness: 92.0 Rockwell "A"**
- **Transverse Rupture Strength: 225,000 psi**
- **Density: 11.68 gms. per cc.**

VR-73—the newest V-R high quality steel-cutting carbide—combines higher edge strength with greater resistance to heat and abrasion—qualities never before available.

Outstanding for all types of general semi-finish and finish machining of the high tensile, high heat-resistant alloys—the superalloys—for missiles, rockets and jet engines!

Maximum performance is assured by its composition, grain structure and exceptional purity. Vascoloy-Ramet's exacting quality control procedures always make a constant, superior, uniform product.

For complete information, call your local V-R representative or distributor.

Booth No. 1035

MANUFACTURERS OF: CEMENTED CARBIDES, TOOLHOLDERS, AND TANTUNG® CAST ALLOY CUTTING TOOLS

Vascoloy-Ramet Corporation

SUBSIDIARY OF FANSTEEL METALLURGICAL CORPORATION

892 Market Street • Waukegan, Illinois

C-656

CIRCLE INFORM-A-GRAM KEY NO. 5

There's a real POINT in using...

SCHRILLO

SINGLE-LIPPED COUNTERSINKS

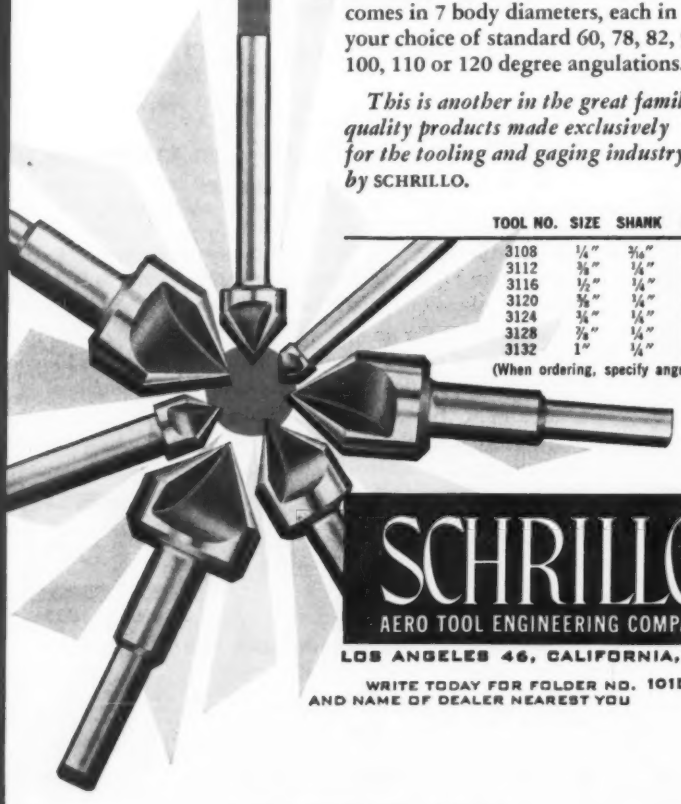
Never before has there been a tool like the SCHRILLO SINGLE-LIPPED COUNTERSINK. Its smooth chatterless operation in even the toughest alloy steels makes it indispensable for efficient countersinking and external deburring applications. The cutting edge and rigid radial relief control are correctly designed for fast, clean cutting.

Produced of specially selected High Speed Steel and heat treated in our own plant to assure uniform hardness, this exclusive SCHRILLO tool comes in 7 body diameters, each in your choice of standard 60, 78, 82, 90, 100, 110 or 120 degree angulations.

This is another in the great family of quality products made exclusively for the tooling and gaging industry by SCHRILLO.

TOOL NO.	SIZE	SHANK	PRICE
3108	¼"	3/16"	$2.05
3112	3/8"	¼"	$2.40
3116	½"	¼"	$2.95
3120	5/8"	¼"	$3.85
3124	¾"	¼"	$4.35
3128	7/8"	¼"	$5.25
3132	1"	¼"	$6.35

(When ordering, specify angulation.)



SCHRILLO
AERO TOOL ENGINEERING COMPANY
LOS ANGELES 46, CALIFORNIA, U.S.A.
WRITE TODAY FOR FOLDER NO. 101D AND NAME OF DEALER NEAREST YOU

CIRCLE INFORM-A-GRAM KEY NO. 6

Coming Events

Apr. 8-10. Industrial Fasteners Institute. Annual Meeting. Boca Raton Hotel, Boca Raton, Florida.

•

Apr. 8-11. Society of Automotive Engineers. Aeronautic Meeting and Production Forum & Aircraft Engineering Display. Hotel Commodore, New York.

•

Apr. 10. American Society of Mechanical Engineers. Production Engineering Conference. Hotel Bancroft, Worcester, Mass.

•

Apr. 14-17. American Society of Mechanical Engineers. Annual Design Engineering Conference & Show. International Amphitheatre, Chicago.

•

Apr. 15-17. American Welding Society. National Spring Technical Meeting & Show. Kiel Auditorium and Hotel Statler, St. Louis, Mo.

•

Apr. 21-23. Metal Powder Association. 14th Annual Meeting and Powder Metallurgy Show. Hotel Sheraton, Philadelphia.

•

Apr. 21-23. Association of Iron and Steel Engineers. Spring Conference. Dinkler Tutwiler Hotel, Birmingham, Ala.

•

Apr. 21-23. Metal Treating Institute. Spring Meeting. Camelback Inn, Phoenix, Ariz.

•

Apr. 22-24. American Society of Lubrication Engineers. Annual Meeting and Exhibit. Hotel Cleveland, Cleveland.

•

Apr. 24-25. Society for Advancement of Management. Annual Meeting. Hotel Statler, New York City.

•

Apr. 30-May 2. Grinding Wheel Institute and Abrasive Grain Association. Semi-Annual Meeting. Grand Hotel, Point Clear, Ala.

•

Apr. 30-May 3. National Screw Machine Products Association. 25th Anniversary Meeting. Drake Hotel, Chicago.

•

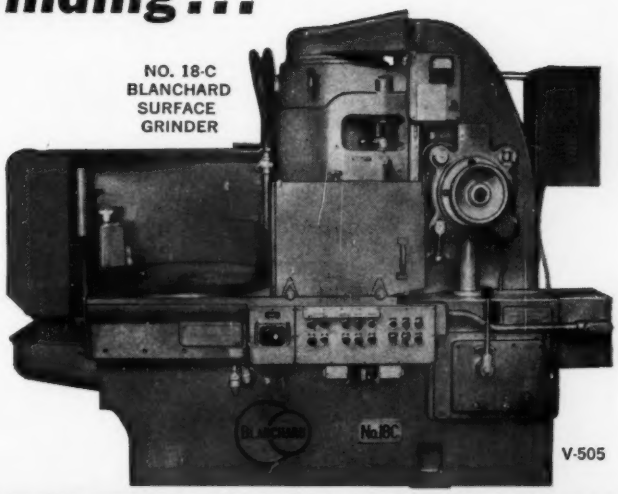
May 1-8. American Society of Tool Engineers. 1958 Tool Show. Convention Center, Philadelphia.

•

May 3-6. National Tool and Die Manufacturers Association. Spring Board Meeting. Hotel Statler, Washington, D. C.

For better, easier grinding...

Whether you're "hogging" off stock from rough castings or precision grinding to a tolerance of ±.0005", you can do it better and easier with the Blanchard No. 18-C Surface Grinder. Once the work is set up, the automatic cycle handles every operation from start to finish. The operator is free to prepare the next load of work or to operate a second No. 18-C Grinder.



Cast Iron Plate. Blanchard ground at the rate of 30 pieces – 60 surfaces – per hour. Stock removal ⅛" each side.

Steel Bars. Blanchard ground at the rate of 48 pieces – 192 surfaces – per hour. Stock .040"-.045" from each side. Limits ±.001" square, flat and parallel.

Hot Rolled Steel Cams. One operator and one No. 18-C Blanchard produce 225 pieces – 450 surfaces – per hour. Stock removal 1/32" each side. Limits ±.001".

just push a button...

- Automatic size control to ±.0005"
- Duplication of repetitive loads
- Pre-set "spark out" time for flatness and surface finish
- No more "operator worry" on close work – greatly reduced fatigue
- A large part of operator's time available for
  (a) Handling or slushing work pieces
  (b) Filing burrs
  (c) Selecting correct wheel and preparing for next job
- Specially-designed sizing device with built-in feature to compensate – automatically – for wheel wear during grinding cycle.

All of these features give you *more efficiency at reduced costs!*

PUT IT ON THE BLANCHARD

Send for your free copy of Model 18-C folder.

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

CIRCLE INFORM-A-GRAM KEY NO. 7

he HAD to use a sanding block!

but YOU can use a Buckeye Air Tool!

Why AIR Tools?

Because air is everywhere, just waiting to be put to work . . . because continuous operation can't possibly harm an air tool . . . and because, if you're using Buckeye air tools, you can almost forget about tool maintenance.

There was a time when muscle power—and plenty of it—was needed to finish off a smooth surface. Today, air power, directed through a Buckeye tool, has replaced muscle power. The work gets done faster, naturally . . . and better, of course.

We don't imagine you're still using a wood block and emery cloth, but it's just possible you're not using a modern Buckeye air tool. And that's the only way you can be sure you're doing your finishing work the best and most economical way.

Our Catalog A-10 contains complete information on the entire line of Buckeye abrasive tools, all of it both interesting and helpful to all portable tool users. If you don't have a copy, send us your name, company and address and we'll correct that situation promptly.

In Air Tools, Your Best Buy Is Buckeye

Buckeye Tools CORPORATION

DIVISION 19 • DAYTON 1, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 8

Talk of the Month

COLD WORKING OF METALS

by D. J. Davis

Vice President — Manufacturing

FORD MOTOR COMPANY

COLD WORKING AND FORMING processes are not new in the automotive industry. Many of the functional and decorative parts of our automobiles are formed by some type of cold working. Sheet metal stampings -- including the deep-drawing of major body components, and the stamping of frames, bumpers, and many other parts — is well established within the industry. Cold heading of bar stock to form bolts and other similar parts is also common practice. We are all familiar with these cold forming processes.

More recently, considerable work has been done in the cold extrusion and rolling of metals. Progress made in the development of both processes has made it possible to apply them to the forming of parts of many shapes and sizes.

Cold forming of parts from bar stock is a process generally consisting of three steps: First, a slug or pre-form is prepared by shearing or cutting a section of bar stock to the exact weight required in the subsequent forming operation. Then the pre-form is coated, first with a phosphate solution and then with a lubricant which is designed to reduce friction in the forming operation and to prevent cold welding of the piece to the die.

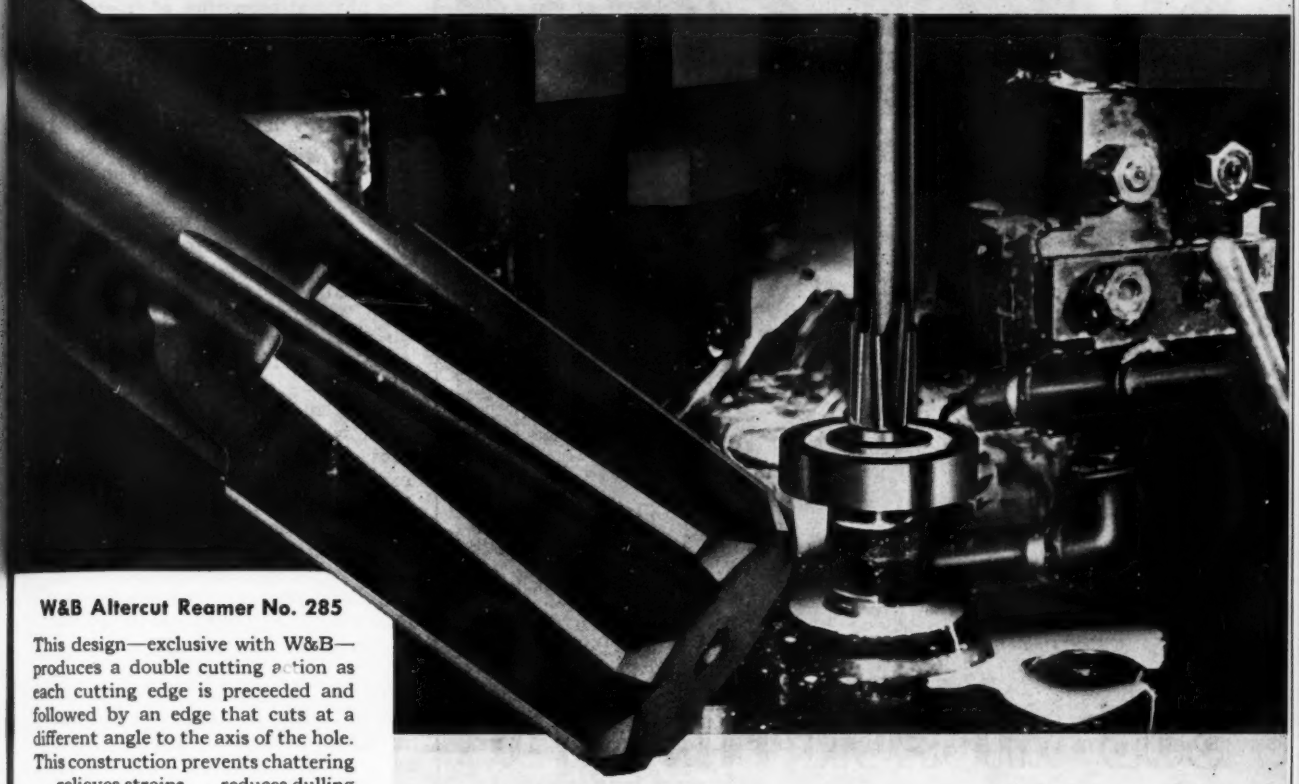
The third step is the forming of the part itself, which may be a single hit or a series of hits. On occasion it may be necessary to include certain annealing or softening operations in the forming sequence to insure maximum formability.

The basic process began in Germany during World War II, when a

Adapted from a talk presented recently at a meeting of the Detroit Chapter of the Society of Automotive Engineers.

. . . *Continued on page 10*

Long range economy PLUS finer finishes
WHITMAN & BARNES REAMERS



W&B Altercut Reamer No. 285

This design—exclusive with W&B—produces a double cutting action as each cutting edge is preceeded and followed by an edge that cuts at a different angle to the axis of the hole. This construction prevents chattering ... relieves strains ... reduces dulling ...furnishes exceptionally fine finishes.

1 Chamfer relief angles are precise ... eliminate chatter and assure longer life.

2 Critical land clearances are accurate ... provide smoother finishes and eliminate binding.

END MILLS
COUNTERSINKS
COUNTERBORES
CARBIDE TOOLS
SPECIAL TOOLS

FREE Reamer Literature Available ... write today!

Because reamers are "size" tools, long life is an important money saving factor. Over 100 years of experience enable W&B to design, manufacture and heat treat reamers that produce—consistently—more holes per sharpening. You get better performance plus extra long-life service! W&B's stock line of reamers include types for practically every reaming operation, however, special reamers to your specifications can also be furnished. Check with your Whitman & Barnes distributor today!

Your Industrial Distributor Can Help You ... With engineering service, recommending the right W&B reamer for your job. With complete in-stock selections of a wide variety of W&B tools. With reliable service and fast delivery on *all* industrial supplies.

INDUSTRIAL DISTRIBUTORS — SERVING INDUSTRY ECONOMICALLY — THE RIGHT HAND OF PRODUCTION

CALL YOUR WHITMAN & BARNES DISTRIBUTOR TODAY!

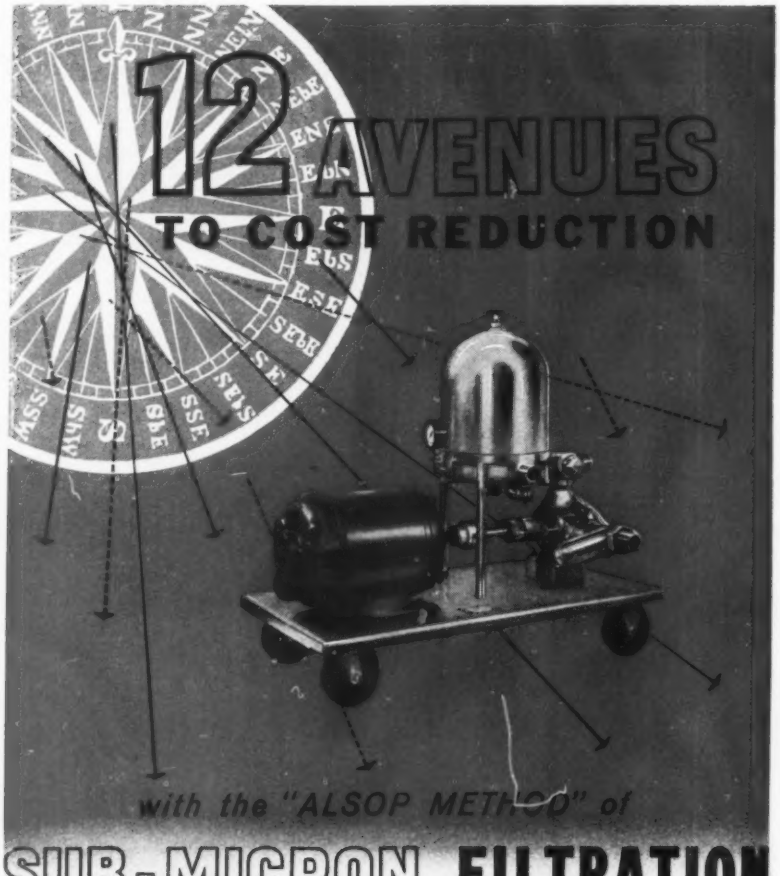
WHITMAN & BARNES

"MAKERS OF FINE TOOLS SINCE 1845"

DRILLS AND REAMERS

40065 PLYMOUTH ROAD • PLYMOUTH, MICHIGAN

NEW YORK CHICAGO LOS ANGELES



SUB-MICRON FILTRATION

*The following cost reductions are substantiated by "in shop" tests:**

1. Increased production
2. Improved finish and controlled accuracy of work pieces
3. Reduction of coolant waste
4. Elimination of systems cleaning
5. Abatement of dermatitis in workers
6. Improved machine cleanliness
7. Prolonged accuracy of tools
8. Longer tool or abrasive wheel life expectancy
9. Reduced wheel loading and wheel dressing
10. Maximum recovery of precious (diamond) swarf
11. Reduced swarf handling and shipping costs
12. Reduction in parts cleaning costs

BOOTH 1062

The "ALSOP METHOD" of sub-micron filtration on coolants, cutting oils and hydraulics is obtained with compact—large area—volume capacity units.

May we have our representative call and discuss a trial demonstration in your plant? No obligation of course.

A request on your letterhead will open these avenues for you.

*Engineering Bulletins on Request

ALSOP ENGINEERING CORPORATION
1304 Andrews Street Middletown, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 10

. . . Month's Talk from page 8

shortage of alloy additives for steels forced the use of lower alloy wherever possible. The cold working process was developed to improve the physical properties of the lower alloy steels to meet the minimum engineering requirements for the manufacture of artillery shells. The significant materials saving made possible by this process gave added impetus to its development.

In early processing, annealing between each of the forming steps was thought necessary to facilitate complete shaping of the part with minimum risk of damage to the forming dies. The process resulted in shells with increased hardness and strength, and allowed alloy-free steel to be substituted for low and medium alloy steel.

In recent years, extensive development work in this country has improved and added to early German extrusion techniques. Today, four basic cold forming methods are utilized in production processes.

The first method, backward extrusion, is used to form cup-like objects from a solid slug. The slug is enclosed in a die, and the moving punch causes it to extrude back along the punch.

The second method is forward extrusion. Here a cylindrical pre-form is forced through a throated die of suitable cross-section to form a stepped shaft.

The third is a modification of the forward extrusion method to form a tube. In this case, the punch is shaped to maintain an internal cavity. Stepped tubular parts can thus be formed.

The fourth method is an expansion of the well-known cold heading technique, in which a rod or wire is upset in a closed die to form a flange or head at one end. By a combination of these methods it is possible to build up a process sequence to accurately form many parts.

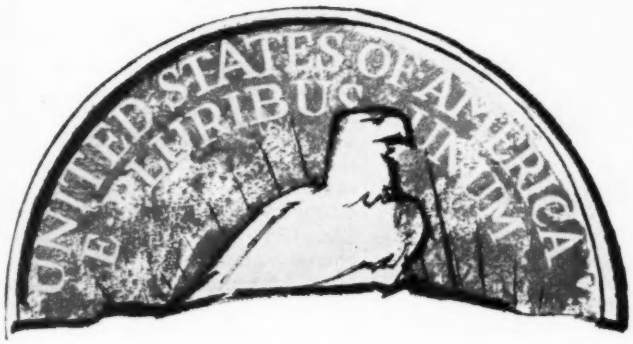
Why More Cold Forming?

As a result of progress in lubricants, in metallurgy, and in die design, the cold extrusion process is now feasible for many manufacturing operations. It possesses several important advantages over other processes, one of which is the significant material saving when compared to conventional methods for forming parts from hot or cold bar stock.

Compared to hot forging, parts can be cold formed to closer and more consistent dimensions. This results in reduction or elimination of stock

. . . *Continued on page 12*

Why pay a premium for lightweight tooling metals?.....



DOW MAGNESIUM TOOLING PLATE

.....costs up to 1/3 less!

It costs less for you to buy because you don't pay premium prices for tolerances you may not need. The fundamental characteristics of magnesium permit rolling and oven thermal flattening to a degree of flatness and surface smoothness satisfactory for virtually all tooling uses. This flatness is not obtainable in other lightweight tooling materials without costly machining of the surface.

Magnesium saves dollars after you buy it, too. It's the easiest tooling metal to cut, machine and weld —and, of course, magnesium jigs and fixtures are the easiest to handle. Add to this the durability, soundness, and dimensional stability which magnesium offers, and you have a lightweight tooling metal which cannot be equalled.

Investigate, and you will find that magnesium COSTS LESS TO BUY, COSTS LESS TO FABRICATE, COSTS LESS TO USE. Let a Dow magnesium supplier show you these savings in dollar and cents figures. Contact him today or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1429B.

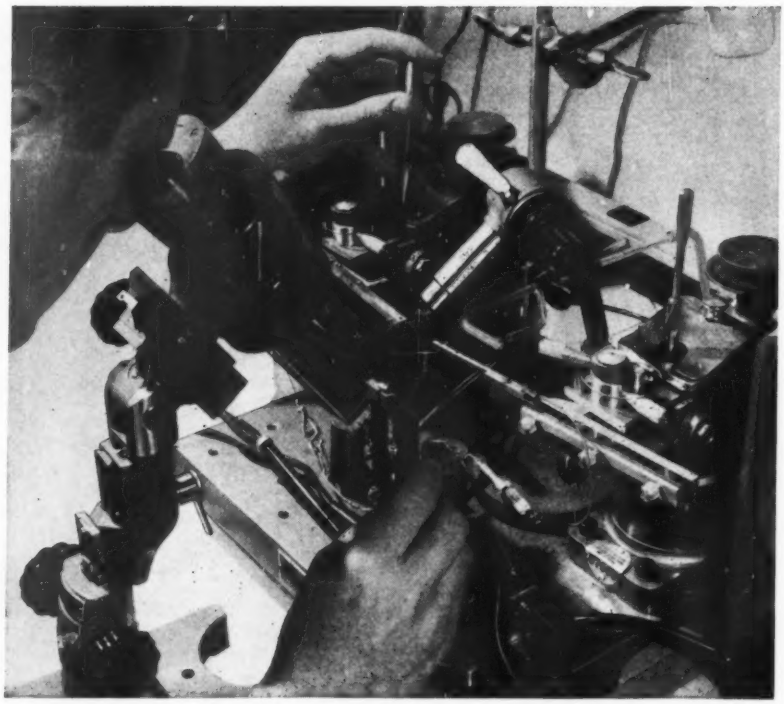
AVAILABLE FROM STOCK AT:

Copper and Brass Sales, Inc., Detroit, Michigan
Fullerton Steel and Wire Co., Chicago, Illinois
Hubbell Metals Inc., St. Louis, Missouri
A. R. Purdy Co., Inc., Lyndhurst, New Jersey
Reliance Magnesium Company, Los Angeles, California
Vinson Steel and Aluminum Co., Dallas, Texas

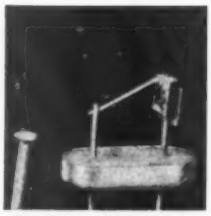
SEE THE DOW DISPLAY at the Philadelphia ASTE Show, May 1-8, Booth 1653.

YOU CAN DEPEND ON DOW

CIRCLE INFORM-A-GRAM KEY NO. 11



3-D MICRO-VISION helps RAYTHEON develop new SPACISTOR amplifier



Spacistor shown next to ordinary pinhead.

The Spacistor, Raytheon's new semiconductor amplifier, opens new horizons in missile and communications equipment design. Still in development, the Spacistor promises to combine many advantages of transistors and vacuum tubes.

Viewed through a Bausch & Lomb Stereomicroscope, contact points that are normally barely visible can be positioned with hairline accuracy. 3-D magnification shows all parts vividly, right side up. Long working distance permits free movement of hands and tools between eyepiece and stage. Dustproof, shockproof optical system, with sharp, flat images free from distortion, assures fatigue-free viewing throughout prolonged examination.

SEE FOR YOURSELF! MAIL COUPON FOR FREE 15-DAY TRIAL

BAUSCH & LOMB

BAUSCH & LOMB OPTICAL CO.
77328 St. Paul St., Rochester 2, N. Y.

☐ I'd like to borrow a B&L Stereomicroscope for a 15-day trial without cost or obligation.

☐ Send me B&L 3-D Micro-Vision Book (Cat. D-15), containing valuable data, showing actual stereo views.

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk from page 10

allowances for scaling and decarburization losses.

Compared to conventional machining from bar stock, cold forming to close dimensions results in the reduction or elimination of stock allowance for machining operations. Thus, a significant amount of material is saved.

Cold forming to closer dimensions leads to the second major advantage — reduced machining requirements. On some parts this has resulted in significantly lower facilities investment costs; costly automation screw machines have been eliminated.

Of course, reductions in machining requirements result in lower cutting tool costs. Elimination of some machining requirements also has an indirect, but no less significant advantage. Design limitations previously imposed by the difficulty in machining some critical contours and radii have been considerably reduced, since these areas can now be cold formed to finish dimensions.

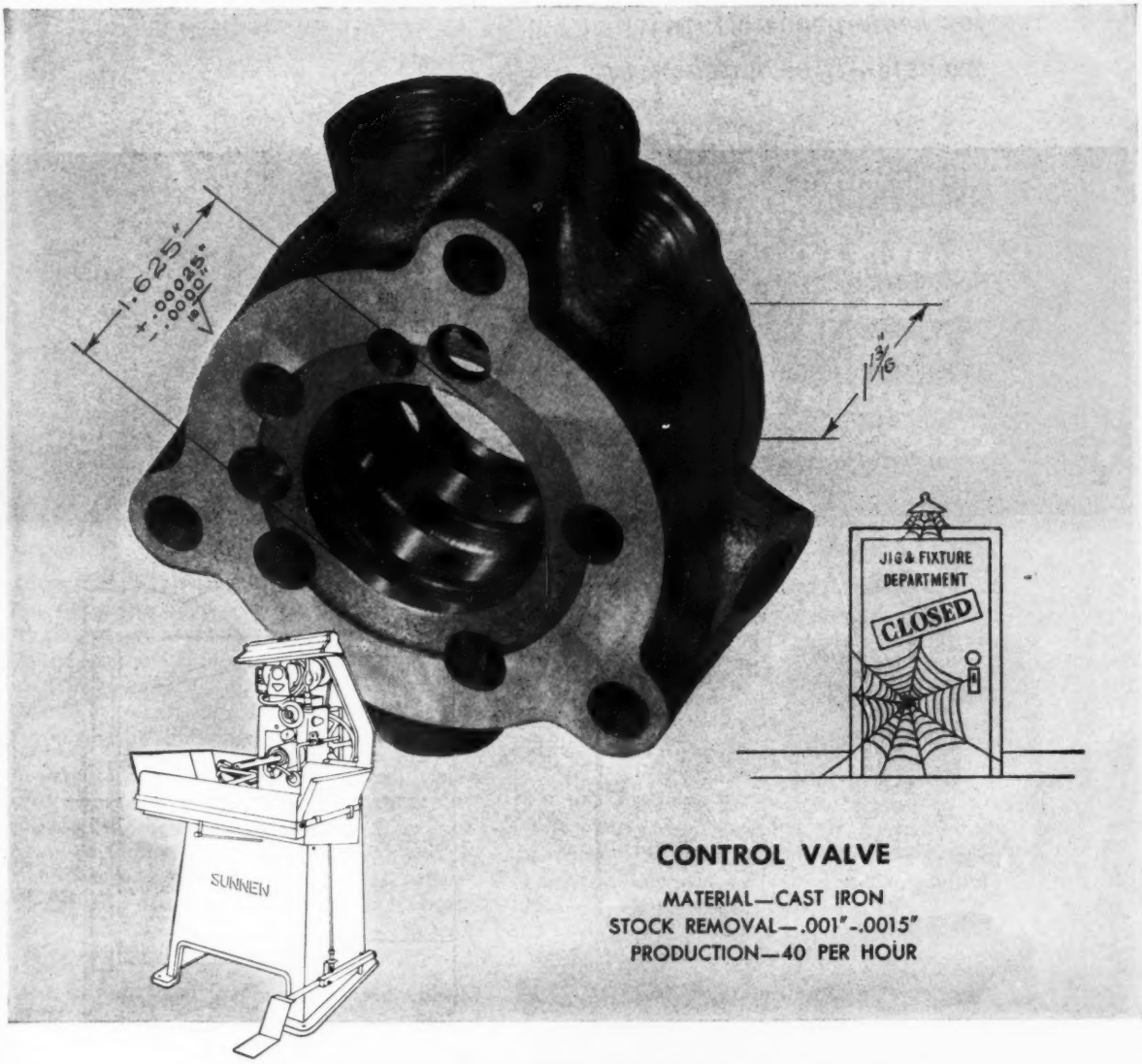
Subsequent improvements in physical properties also result from the cold forming technique. It produces an improved grain flow that does not outcrop into machine fillets and radii, as often happens in the case of forgings and bar stock. Secondly, cold forming can improve the strength characteristics of metal through the cold working and hardening process. Thus for many parts, heat treat operations may be eliminated. Finally, cold forming to finish dimensions eliminates tool marks and produces a superior surface finish, thus reducing the need for grinding or other expensive surface treatments.

Ford Cold Forms Piston Pins

The first Ford production application was cold forming the piston pin. On a cut-off machine four slugs are cut simultaneously from bar stock to an exact weight. This is a critical step in the cold forming process. If the pre-form does not contain enough material, the finished part will not be completely formed. If the pre-form contains too much material, it can break the dies, since these dies completely enclose the pre-form. The weight tolerance allowed in forming the half-pound slug or pre-form is half a gram.

Next, baskets loaded with pre-forms are revolved through a phosphate solution, followed by the application of a metallic soap to serve as a lubricant during the forming operation. Finally, the pre-forms are loaded into a double-ended press,

. . . *Continued on page 18*



CONTROL VALVE

MATERIAL—CAST IRON
STOCK REMOVAL—.001"-.0015"
PRODUCTION—40 PER HOUR

GET DISTORTION-FREE BORES
WITH FIXTURE-FREE HONING

With Sunnen Honing as your final bore-sizing process . . . the workpiece is free and uncramped. No holding fixtures are used! The finished bore will not change shape—immediately or later—as there is no stress to relieve.

Savings are substantial—no fixture cost, no set-up time, no loading or unloading.

Sunnen Honing gives you perfect control of stock removal, size and finish at all times. Errors of previous hole machining operations are corrected once and for all.

With Sunnen Honing you're equipped to produce precision holes of nearly any diameter and length combination . . . in practically any shape part . . . small lots or production runs.

GET ALL THE FACTS ON SUNNEN HONING

SUNNEN® PRODUCTS COMPANY
HONING
7928-P Manchester Ave. • St. Louis 17, Mo.

SEND FOR FIVE INFORMATIVE BOOKLETS

CHECK READER SERVICE CARD

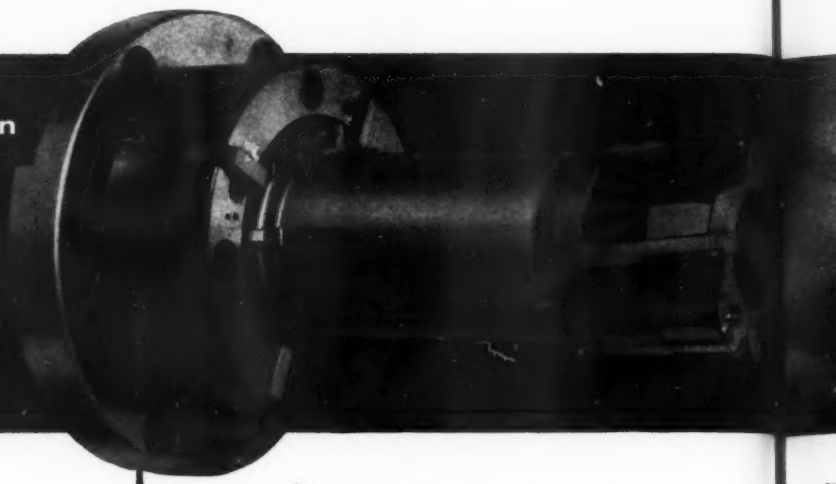
7168

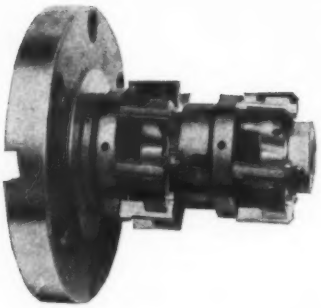
CIRCLE INFORM-A-GRAM KEY NO. 13

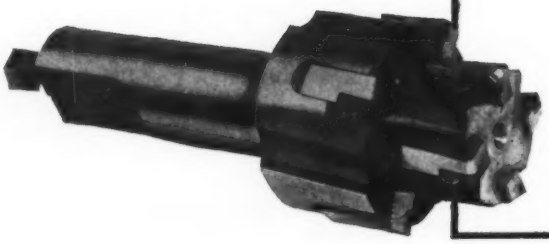
for high-production,
transfer-type machining...

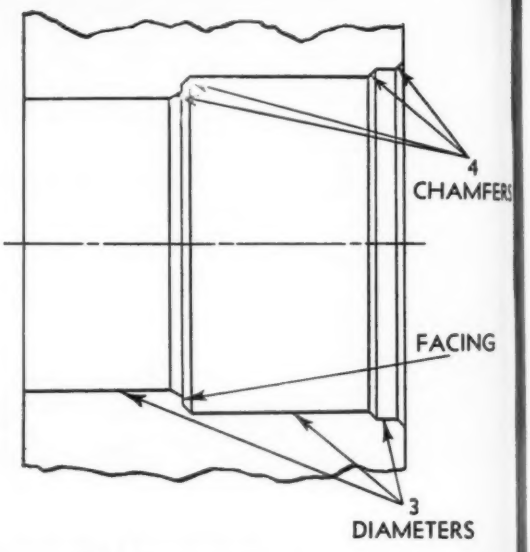
Barber-Colman

MULT-O TOOLS SAVE TOOLING COSTS!









Eight surfaces cut by one MULT-O Tool

'58

SEE THEM ON DISPLAY . . . BOOTH NO. 1255

These Barber-Colman Mult-O Tools perform 34 machining operations on power steering housings which are processed on a 35-station Greenlee transfer machine. A total of nineteen tools ranging from .220" to 6.250" diameter combine multiple operations for facing, hollow milling, boring, reaming and chamfering.

In most cases, one tool performs several operations. The sample drawing shows the eight surfaces which are cut by one tool. There are four chamfering operations, one facing operation, and the tool reams three different diameters. All tools are designed to perform a maximum number of operations. This combination of operations results in a minimum number of spindles.

Most cutting edges are carbide tipped inserted blades. Carbide tips provide long tool life, and the inserted blades result in low tool cost since only the blades require replacement. Wherever possible, standard blades are used so that they can be obtained from stock. Conventional sharpening methods are used on all tools.

In designing high-production Mult-O Tools of this type, Barber-Colman Engineers consider chip load, finish required, and amount of stock to be removed for determining the number of blades in each tool. Holding means and type of blade mounting are designed to suit each particular application and size of tool.

On this job, machine designers supplied part prints, sequence of operations and production requirements. With this data, Barber-Colman Cutter Engineers designed tools to combine multiple operations for the most efficient results.

Mult-O Tools can also offer cost saving advantages for *your* production operations. If you use multiple operation, transfer-type machining in production, ask Barber-Colman Engineers for analysis and recommendations on cutting tools which produce maximum efficiency. Send part prints and production desired. A representative will be glad to discuss your requirements on request.

BARBER-COLMAN COMPANY

8104 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

CIRCLE INFORM-A-GRAM KEY NO. 18

PUT A BELLOWS AIR MOTOR ON YOUR COST CUTTING COMMITTEE AND FORGET THE HATCHET

Cost cutting programs that start out with a conference and end up with a hatchet may save a dollar today and cost ten tomorrow.

The cost cutting program that's worth its salt works on the assumption that the best way to save money is to produce in less time.

That's where we come in. The Bellows Air Motor and other Bellows "Controlled-Air-Power" Devices can shave costs faster than an electric shaver can shave a peach. They do it by making automatic (or semi-automatic) almost any type of repetitive operation involving push, pull, lift or turn motions—with the direct result of less labor cost per part produced.

These ingenious electrically (or mechanically) controlled, air-powered work units can be easily installed on your existing machinery, or in combination with such standard items as brackets, switches, etc., can be made into low cost special purpose machines. When one run is over they can be easily dismantled and re-assembled to do another job.

Yes, when it comes to cutting costs Bellows Air Motors are a production man's best friends. They put practical automation within easy reach of every plant in every industry.

Would you like to see a file of cost cutting ideas other companies have developed using Bellows Air Motors? Write Dept. TP458, The Bellows Co., Akron 9, Ohio.
In Canada: Bellows Pneumatic Devices of Canada, Lt., Toronto 18

The Bellows Co.

DIVISION INTERNATIONAL BASIC ECONOMY CORPORATION
AKRON 9, OHIO

1061-B

CIRCLE INFORM-A-GRAM KEY NO. 16

new

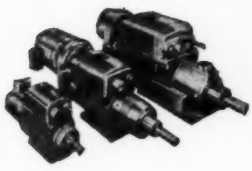
HARTFORD DOUBLE END MACHINE

$3,565* Complete

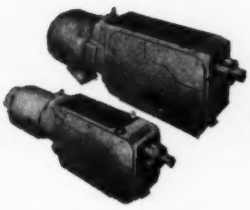
Model 10-210 as shown less fixture, F.O.B. Simsbury, Connecticut. Price and specifications subject to change without notice.

- Opposed operations simultaneously
- Quick change of stroke, feed rate, spindle speed and unit position
- Handles parts up to 28" long
- Available with manual or automatic interlocked cycle
- Coolant tank, coolant pump, chip pan and coolant troughs integral with base
- Drill capacity to 5/16" in mild steel with 19-150 Unit
- Tapping capacity 3/8" with a maximum stroke of 1½"
- Use with small index table, manual or air clamp fixtures, hopper load devices or vibration feeders
- Adaptable to multiple spindle head applications
- Performs two operations per hole with index table
- Inexpensive, fast, flexible centering operations
- Available as basic machine — completely tooled or as separate components

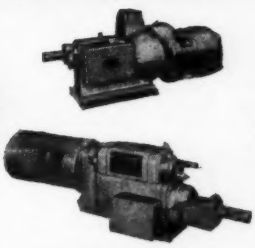
Rectangular Bases — 8" x 60" finished mounting pad accommodates a variety of drilling, boring or tapping units. Coolant tank with pump mounting flange, drain port, chip pan and large coolant troughs included. Adaptable to small index tables, air clamps or other part locators.



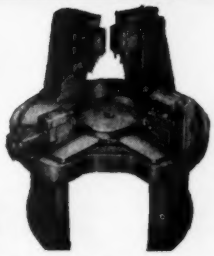
Automatic Drilling and Tapping Units — The Hartford Model 19-150 Quill Type Drill Unit is ideally suited as a working unit on the Double End Machine for production drilling, tapping, reaming, spot-facing, centering, milling, chamfering and countersinking. Other Hartford Units can be readily adapted also.



Automatic Cam Feed Drilling Units—Two models of these mechanical feed units are available. Designed for use with multiple head as well as single spindle applications, these electric clutch units are compact, dependable and fast cycling. They provide positive accuracy on long run jobs.



Automatic Lead Screw Tapping Units—No. 22 unit, above, features lead change through gearing from master lead screw. No. 19-175 unit, below, features variable quick advance stroke before starting lead screw spindle.



Other Hartford standard basic components including circular bases, straight post columns, tunnel columns and unit adapters can be combined with standard Hartford drilling and tapping units for assembly into production machines such as the 65" horizontal indexing machine shown above.

HARTFORD *Special*

Hartford also makes automatic Thread Rolling Machines,

Machine Tool Division
THE HARTFORD SPECIAL MACHINERY CO.
2924 Homestead Ave., Hartford 12, Conn.

Send me complete information on Model 10-210 Machine and other machine components.

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State____

. . . Month's Talk from page 12

which backward extrudes both ends of the pin simultaneously.

This process is currently used at two Ford plants. Over a period of three years, we have cold formed more than 20 million piston pins.

At one of our engine plants a special loading fixture feeds the preforms into dies set in a trunnion-type rotary dial. The dial revolves in a vertical plane, and indexes the dies on each stroke of the press to line up with the permanently located extrusion punches. The punches are mounted on individual rams which are actuated in a horizontal plane at the moment dial indexing is complete. The pins are formed by a double-backward extrusion process, in which the punches enter both ends of the slug at the same time. Finished pins are knocked out of the die onto a conveyor.

Less than half a pound of material is required now that the piston pin is cold formed, compared to almost three-fourths of a pound required by the previous screw machine process. In the latter process, a quarter pound of useless chips was produced with each pin. This quarter-pound of steel saved on each pin grows to significant proportions when it is realized that eight pins per engine, at an annual production of two million engines, means a saving of 2,000 tons of steel on this single part.

In addition to material economy, piston pins produced by the cold forming process have superior engineering features when compared to pins made by the screw machine process. In fatigue tests, the cold formed pin averaged over 51,000 cycles to failure, while the machined pin averaged approximately 15,500 cycles to failure.

More Cold Formed Parts

Another cold formed part now being made in production is the truck wheel nut, which is formed by a two-step extrusion process. In the first step, the pre-form is cold headed to increase the diameter of the blank at the extrusion end. In the second step, it is extruded forward to form the nut, backward to form the barrel, and upset to form the flange. This job illustrates how parts may be formed by utilizing various combinations of cold forming methods. Production of this part by the cold forming method eliminated a costly screw machine process and a milling operation on the square end of the nut.

We also extrude engine tappets by means of a rotary dial similar to the one used to form piston pins. This dial, however, indexes through the extruding, coining, and knockout stations in a horizontal rather than a vertical plane. The strippers transport the part between stations as the dial indexes.

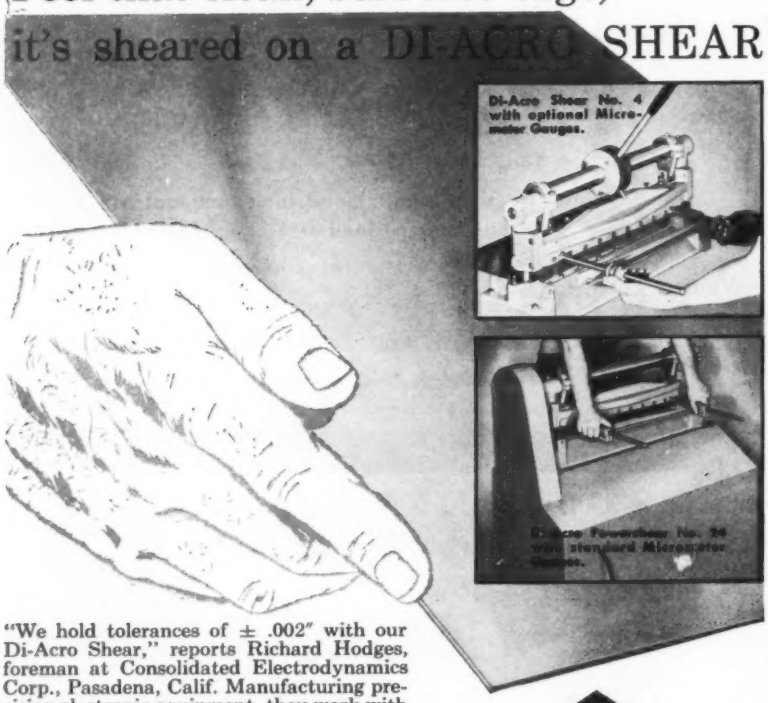
This production setup and the piston pin job would have been impossible without significant developments in the design of cold forming dies. These developments have made it possible to reduce greatly the size of such dies, while maintaining their capacity to take higher compression loads.

In addition to the parts already described, we are also using a cold formed tractor power take-off shaft in production quantities. Tensile strength, yield strength, and hardness are considerably increased after cold forming, and the improved physical properties gained by this process also make it possible to meet a Brinell range between 286-321 without heat treating.

The tractor power take-off shaft is typical of a type of part widely used in automotive and related manufacturing. The same basic process can be applied to the production of a

. . . Continued on page 22

Feel that clean, burr-free edge;
it's sheared on a DI-ACRO SHEAR



"We hold tolerances of ± .002" with our Di-Acro Shear," reports Richard Hodges, foreman at Consolidated Electrodynamics Corp., Pasadena, Calif. Manufacturing precision electronic equipment, they work with a variety of sheet materials—fish paper, beryllium copper, phosphorous bronze, hot and cold rolled steel, aluminum, etc. "Parts must be burr-free—require no milling to assure a 'light-tight' fit."

• • • •

The Di-Acro Vari-O-Speed Powershear will shear up through 16 gauge mild steel, ⅛" in some aluminums, plastics, rubber and many other sheet materials—accurately cut strips less than .025" wide. Speed rivals that of big machines. No skilled operator required—women can operate it.

Available in two power models in 12" and 24" widths and four hand operated models 6" to 24" wide. "Quick-Set" Micrometer gauges are standard on power models, accessories on hand operated shears.

See Di-Acro machine at Booths 813-821 ASTE Show, May 1-8, Convention Center, Philadelphia, Pa.

Consult the Yellow Pages of your phone book for the name of your nearest Di-Acro distributor or write us.

pronounced die-ack-ro

di-acro PRECISION METALWORKING MACHINES

O'NEIL-IRWIN MFG. CO.

315 8th Avenue, Lake City, Minnesota

CIRCLE INFORM-A-GRAM KEY NO. 18

The Candy with the Hole in the Middle

*The Drill Bushing with the Hole in the Middle **

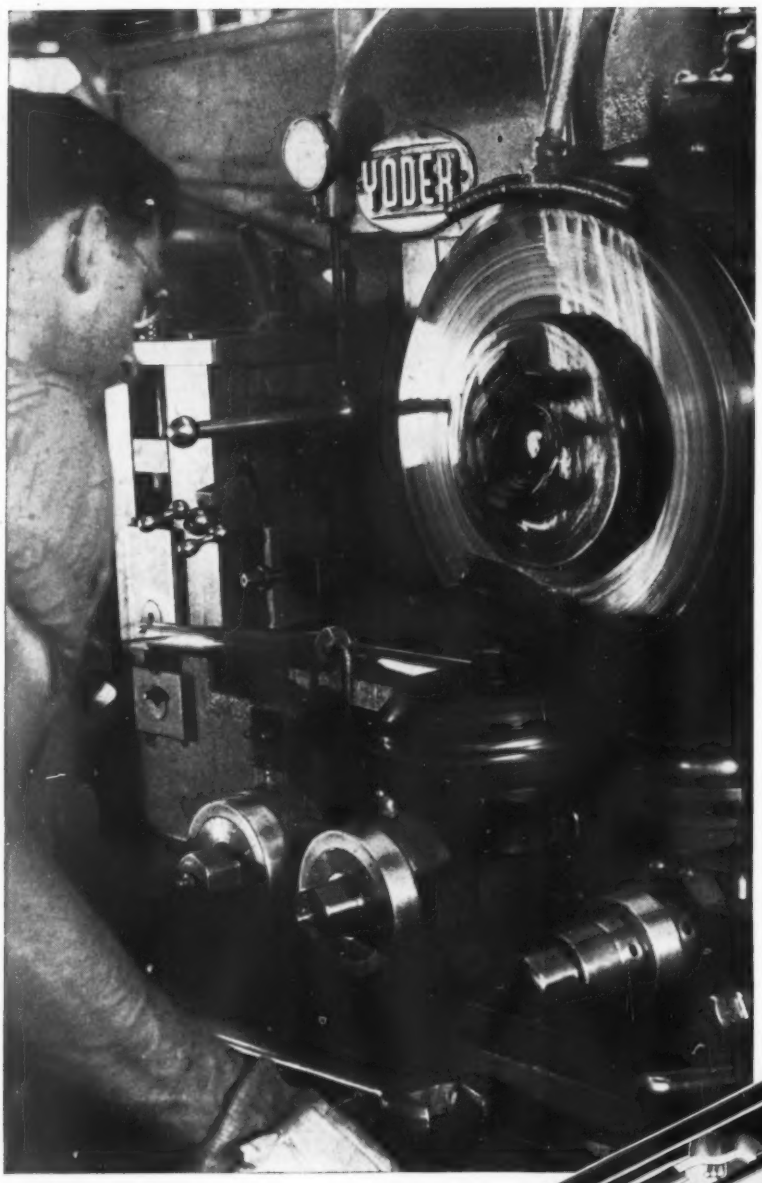
* Our 100% concentricity inspection means every hole is EXACTLY centered. Another "Life Saver" for you!

American
DRILL BUSHING CO.
5107 Pacific Boulevard
Los Angeles 58, Calif.

SEND NOW FOR FREE COPIES OF OUR NEW CATALOGS

SEE US IN PHILADELPHIA — BOOTHS 1749 AND 1753 — 1958 ASTE TOOL SHOW, MAY 1-8

CIRCLE INFORM-A-GRAM KEY NO. 19



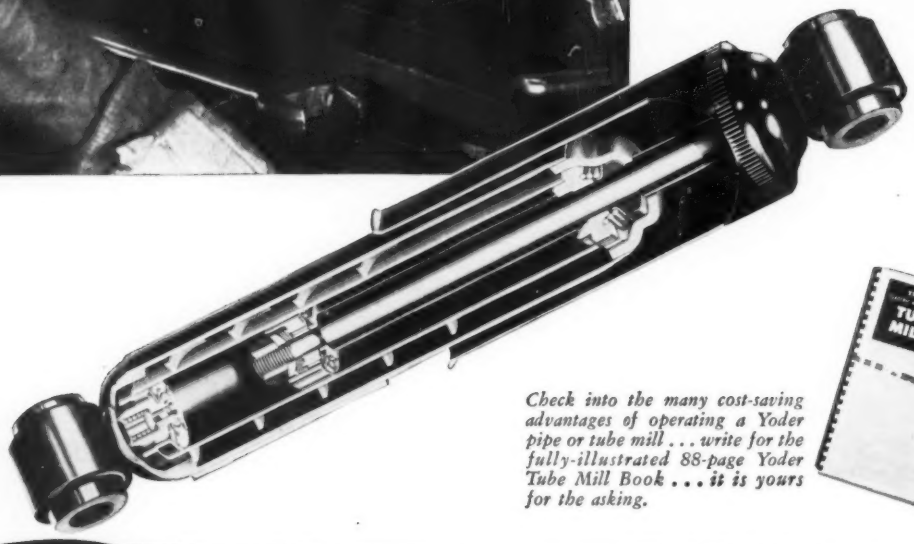
Monroe Shock Absorbers rely on performance of YODER Tube Mills!

After 15 years of continuous operation the Yoder Type-M Electric-Resistance Weld Tube Mill shown here, is still producing precision tubing for the Monroe Auto Equipment Co., Monroe, Michigan.

Yoder produced tubing is the basic component of the famous "Monro-Matic" shock absorber. Measuring 2 1/64" outside diameter (plus several other sizes) the tubing is made from 22 gauge strip in one continuous operation . . . it is automatically cold-roll formed, welded and cut to pre-determined lengths.

This typical installation of a Yoder tube mill exemplifies the accuracy, dependability and production economies of Yoder-made tubing. If your business requires pipe or tubing, ferrous or non-ferrous, in sizes from 1/4" to 26" diameters, there is a Yoder mill designed to produce it economically, efficiently and accurately.

THE YODER COMPANY
5501 Walworth Avenue • Cleveland 2, Ohio



Check into the many cost-saving advantages of operating a Yoder pipe or tube mill . . . write for the fully-illustrated 88-page Yoder Tube Mill Book . . . it is yours for the asking.

ENGINEERING **YODER** MANUFACTURING

PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES

CIRCLE INFORM-A-GRAM KEY NO. 20

UNIVERSAL DRILL BUSHINGS

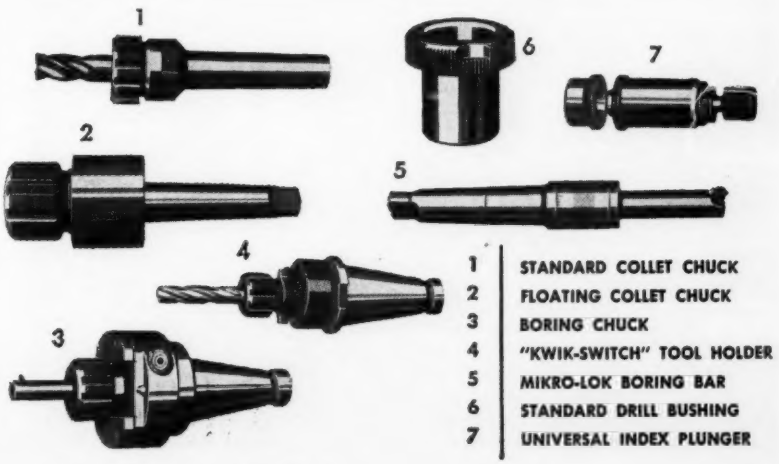
INSURE PERFECT ALIGNMENT AND LONG LIFE OF PRODUCTION TOOLS

SUPERFINISH BORES REDUCE TOOL WEAR
KNURLED HEADS PROVIDE GOOD GRIP
100% CONCENTRICITY AND HARDNESS TESTS INSURE ACCURACY
BLENDED RADIUS HELPS PREVENT TOOL HANG-UP

Universal Drill Bushings are available in a complete range of standard sizes and lengths. Special sizes made to order. Write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

181

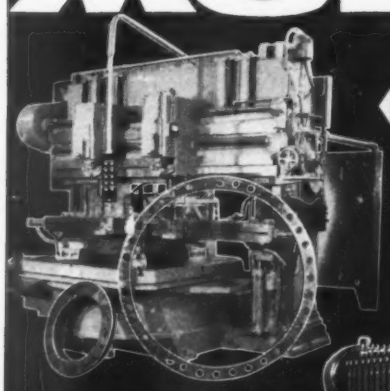
UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 8
MICHIGAN



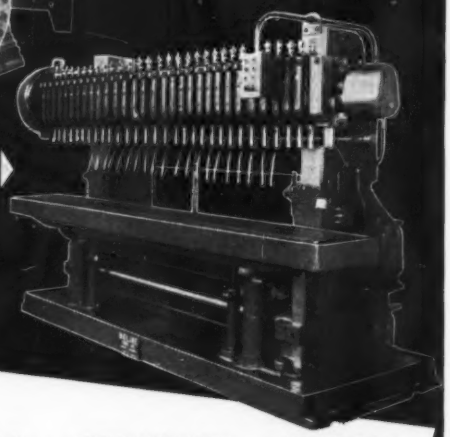
1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

CIRCLE INFORM-A-GRAM KEY NO. 21

MOLINE



HD68 drills bolt circles from 12" to 100" diameter. Each of the two spindles has capacity for 2½" drill in steel. Operating cycle is fully automatic.



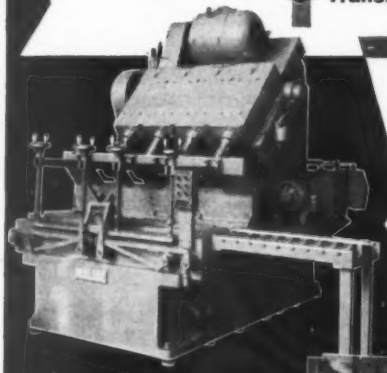
HD13 straight line-type drilling machine with capacity for thirty ¾" drills in steel. Used for work on heavy castings, round and rectangular steel tubes, structural shapes, plates and grader blade drilling or countersinking.

For Greater PRODUCTION . . . EFFICIENCY . . . SAVINGS

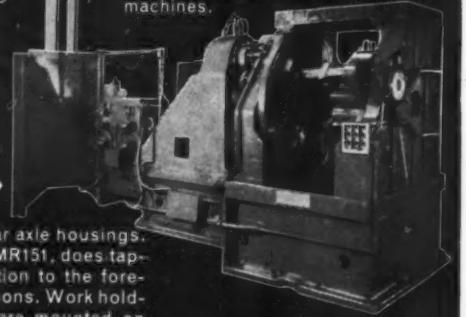
Use an individually designed "Hole-Hog" Machine Tool for such jobs as...

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Transfer-Type and Special Machines

OVER 57 YEARS OF MACHINE TOOL ENGINEERING EXPERIENCE IS AT YOUR SERVICE. TELL US YOUR PARTICULAR PROBLEM



13CB hydraulic feed cylinder boring machine. V-8 engine blocks are rough and finish bored for wet-type cylinder sleeves. Units of this kind are applicable for transfer machines.



MR152 performs drilling, reaming, spot facing and chamfering operations on tractor rear axle housings. A companion machine, MR151, does tapping in addition to the foregoing operations. Work holding fixtures are mounted on power driven trunnion.

MOLINE TOOL CO. HOLT-MOLINE MOLINE, ILLINOIS

MOLINE TOOL COMPANY
REPRESENTATIVES IN PRINCIPAL CITIES
100 20TH STREET • MOLINE, ILLINOIS

109

CIRCLE INFORM-A-GRAM KEY NO. 22

. . . Month's Talk from page 18

number of other parts. The process involves a series of hits, each designed to form one portion of the stepped shaft. Even the spline teeth can be cold formed rather than machined to finish the part.

This process, called cold rolling, is being used in production at Ford. At the present time, splines on seven production shafts are being formed by the cold rolling process: two rear axle shafts, four transmission shafts, and a steering sector shaft.

Prior to the rolling process, the usual method of forming splines was by hobbing. In this machining process, a shaft, turned to the major diameter of the spline, is placed in a hobbing machine. A multiple tooth hob then cuts grooves on the shaft to produce the splines.

In the spline rolling process, a shaft turned to the approximate pitch diameter of the spline is placed between two racks into which the spline form has been ground. By moving the racks in opposite directions, the shaft is rolled between the racks so that the teeth are pressed into the shaft. The metal thus displaced flows into the root spaces of the rack teeth and forms the spline. In most cases the change from hobbing to rolling required that part specifications be changed from straight-sided to fine pitch involute splines.

Fatigue tests of shafts with the roller involute spline indicated considerable improvement in the strength characteristics of the shaft. This was due to the increased root diameter of the spline, the superior finish of the rolled spline, the cold-working of the material surface, and the greater number of teeth.

Advantages of Spline Rolling

Spline rolling possesses several advantages over hobbing or other methods of machining. One of these is closer dimensional control. Splines can be produced to closer and more consistent tolerances by rolling than is generally possible by hobbing or shaping. In addition, rolling produces parts with superior strength characteristics, since the process cold-works the steel during the forming operation. It also results in reduced tool grinding and downtime, as well as lower facilities and tool costs/pc, due to higher productivity.

Let me give you an example of this advantage: On one of our rear axle shafts an eight-spindle rotary hobber, costing about $100,000, will produce 110 pcs/hr. The same part can be

. . . Continued on page 26

More pieces per man-hour in your plant can start right here

If you want to get more out of your man-power, think *first* of power chucking . . . on the machines in your shop or the lathes you are planning to buy.

The successful application of power chucking to your machines and your work calls for highly specialized and imaginative engineering know-how. Skinner puts by far the largest engineering team in the industry at your service through your nearby Industrial Distributor. Put your power chucking problems up to him, or, if you prefer, write directly to our engineering department.

For information about Skinner's complete range of basic power chucking equipment, write for catalog to Dept. 194.

SKINNER CHUCKS

THE SKINNER CHUCK COMPANY

ESTABLISHED 1887

NEW BRITAIN, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 23

How Fred Lee

Stan Bozek, Abrasive and Methods Engineer at Marlin-Rockwell Corp., Plainville, Conn., discusses new form grinding technique for ball bearing races with Fred Lee, Manager of Bay State's district office in Bristol, Conn.

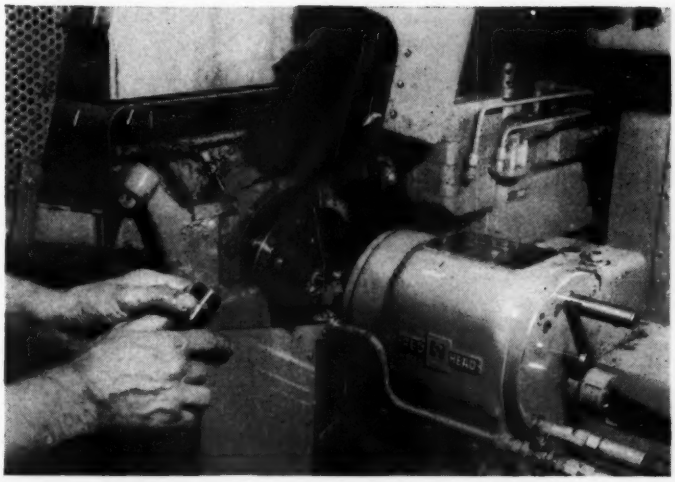
...helped revolutionize the grinding of bearing races

Ball bearings used in missile guidance systems and other highly critical applications have to have super-accurate races . . . but cost is vitally important, too. That's why Marlin-Rockwell Corp., of Plainville, Conn., was one of the first bearing manufacturers to switch from the oscillating rubber wheel grinding technique to form grinding.

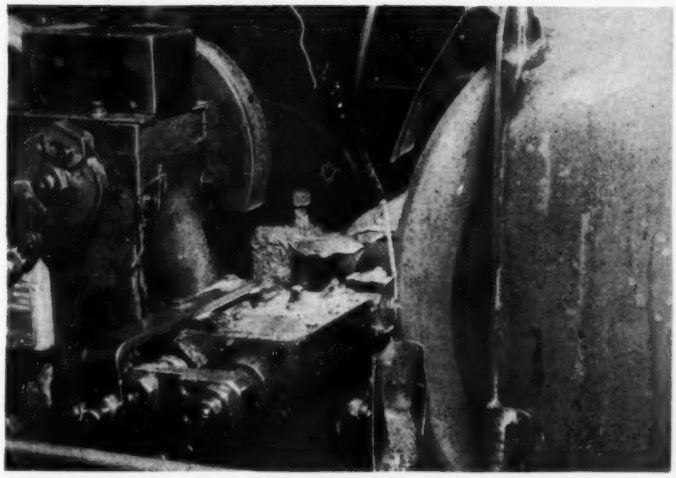
Bay State's Fred Lee, recognized as one of the country's leading authorities on bearing grinding, was called in to discuss the problem with Marlin-Rockwell engineers. After exhaustive study, he specified semi-friable, fine grit, medium grade vitrified wheels that varied in size from ½" to 20" diameter.

Result: 50% closer confinement of race curvature, 100% improvement in roundness and consistent uniformity in multiple production runs. General foreman John Gworek, veteran of 30 years of precision bearing grinding, says flatly: "It's the *only* way to grind them."

Like Fred Lee, your own Bay State representative may be best known as an expert in a particular type of grinding but his general knowledge of grinding techniques is both wide and deep. **Better grinding at lower cost . . . that is his business.**



Form grinding 2 ball races at the same time on water pump bearings with Bay State vitrified wheel, diamond dressed only every sixth piece, on Heald 1701 Form Grinder.



Rough form grinding O.D. contour of inner races with 20" diam. Bay State vitrified wheel (Crush formed) on Cincinnati Microcentric Grinder.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

STEEL from Wheelock, Lovejoy BULLETIN

W-L CHICAGO Now in an ideal position to supply HY-TEN "M" Temper in large forged flats up to 6 x 22", rounds to 18" and squares to 17½". Also "B" No. 3-X in large forged flats to 6 x 13", rounds to 18" and squares to 16". Alloy forgings a specialty.

W-L DETROIT The new, larger warehouse and office here have greatly speeded up delivery on our orders and services in this area. Have a good stock of A-8620 on hand as well as all HY-TEN grades.

W-L CLEVELAND The rolls for this Vaughn Four-Roll Continuous Pointer are fabricated from HY-TEN "M" Temper, nickel-chromium-molybdenum oil hardening steel. This Pointer, largest of its type in the world, can point rods ranging from ½" to 1¼" dia. HY-TEN "M" was selected by the machine manufacturer because it can be quenched and tempered to high hardness levels while retaining considerably greater toughness than would be possible with most other steels.

W-L CINCINNATI Another new and larger warehouse recently opened here. Same-day service on all sizes, shapes and grades of HY-TEN, plus our usual help on metallurgical problems.

W-L HILLSIDE, N. J. This W-L warehouse has an excellent stock of HY-TEN "B" No. 3-X in rounds, flats and squares. Same-day delivery is promised. Many of the larger sizes of forged rounds are rough turned.

W-L CAMBRIDGE HY-TEN "B" No. 2 is still a great favorite in New England for parts requiring medium duty and high quality at a reasonable price. Our research and development assure better HY-TEN specials — "the standard alloy steels of tomorrow."

W-L BUFFALO New HY-TEN "B" No. 3X-40 now available here in rounds ½" to 8¼" and hexagons 1¼" to 2¾", heat treated to 300 Brinell. Machines as easily as heat-treated 4140 leaded, but less expensive. Suitable for flame or induction hardening — tough and shock resistant.

Write our Cambridge office today for your *free* Wheelock, Lovejoy Data Sheets. They'll give you complete technical information on grades, applications, physical properties, tests, heat treating, etc.

WHEELOCK, LOVEJOY & COMPANY, INC.

135 Sidney Street, Cambridge 39, Mass.

AMERICAN STEEL WAREHOUSE ASS'N

AGENTS: Southern Engineering Company, Charlotte, N. C.; Sanderson-Newbould, Ltd., Montreal & Toronto

CIRCLE INFORM-A-GRAM KEY NO. 26

. . . Month's Talk from page 22

produced on a single-station rolling machine, costing $27,000, at a rate of 300 pcs/hr. Thus, with a facilities investment of only about 25% of that required for hobbing, the rolling method will increase productivity by almost 200%.

In some cases spline rolling racks have produced one million pieces before grinding, compared to an average hob life of 3,000 pcs. Furthermore, since metal is moved rather than removed during the rolling process, a saving in material is realized. Finally, cold rolling eliminates all chip handling and disposal problems.

As the refinement of steel making and heat treating processes makes cleaner and more workable steels available, it will be possible to apply the cold extrusion process to more medium and higher alloys steels. Current material limitations will be greatly minimized as developments in alloys and dies become available for production applications.

In the field of cold rolling, progress in tooling, in machinery, and in material indicates that we can also expect to see the rolling process applied to an ever-greater variety of splines and similar shapes.

Finally, as development work continues, improved material grain flow and other desirable metallurgical properties resulting from both processes will offer a real challenge to the produce design engineer. Through progress in this field, he will have the opportunity to take advantage of material properties which have never before been utilized in the development of better products, and better ways to make them. end

FILMS TO SEE

An axial flow compressor is the subject of a movie which illustrates the compressor's mechanical principle of blades rotating at close tolerances between stationary blades to move gases in tremendous volume and under pressure. Carrier Corp. of Syracuse, N. Y., will lend the film.

"Moving Mountains" is the title of a 27-min, 16mm color film which shows how mobile materials handling equipment has made the handling of products and materials more efficient. Request information about the film from Community and Industrial Relations Dept., Clark Equipment Co., Buchanan, Mich.

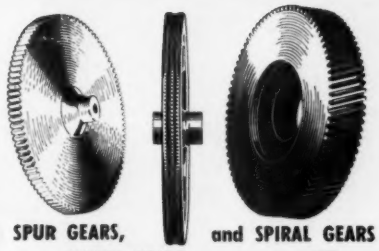
ALL THE PRODUCTION YOU'LL EVER WANT — ALL THE PRECISION YOU'LL EVER NEED

BUT MY WORK INCLUDES THE MANUFACTURE OF—

I KNOW! AND YOU CANNOT POSSIBLY BUY A BETTER MACHINE FOR THE JOB THAN—

THE HAMILTON No. 1-B PRECISION SMALL GEAR HOBBING MACHINE

INVESTIGATE IT! YOU'LL SEE!



SPUR GEARS, and SPIRAL GEARS

WORM GEARS, (up to 6" O.D.)

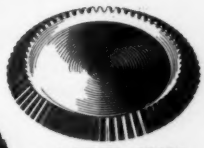
WORMS

SPECIAL TOOTH FORMS

GEAR SECTORS

PINIONS

and FACE GEARS



and BEVEL GEARS (up to 3" O.D.)

2564

ASK for our gear hobber literature packet No. GH-740

Hamilton

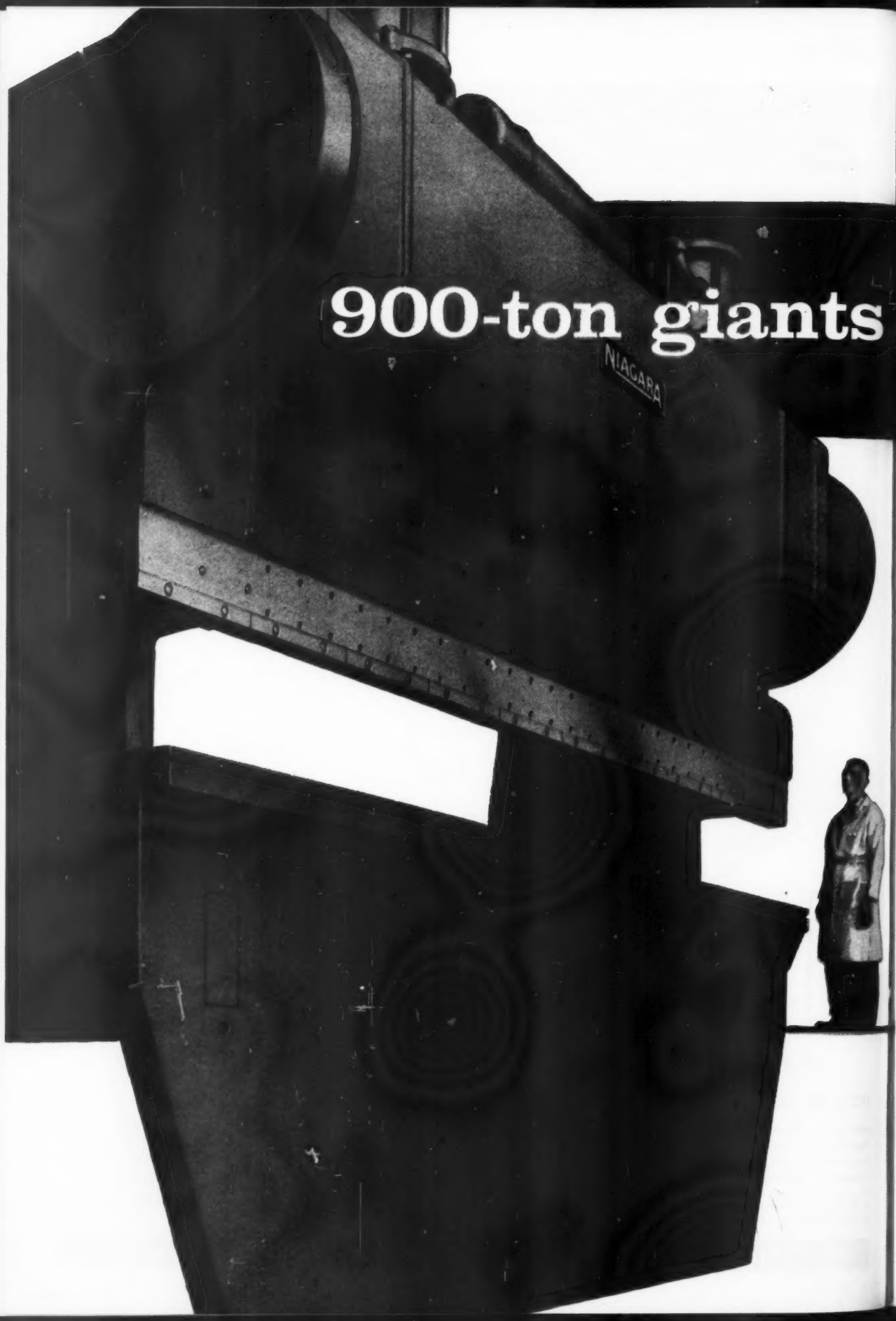
PRECISION SMALL-GEAR HOBBING MACHINE

THESE ARE REPRESENTATIVE USERS OF HAMILTON GEAR HOBBING EQUIPMENT

AiResearch Manufacturing Co. • *Duncan Electric Co.* • Bendix Aviation Corp. • *Victor Adding Machine Co.* • Lear, Co. • *Minneapolis-Honeywell Regulator Co.* • Geophysical Machine Works • *Hughes Aircraft Co.* • Westinghouse Electric Corp. • *Rockwell Meters, Inc.* • Borg Products Division • *Herschede Hall Clock Co.* • U. S. Navy Electronics Laboratory • *Redstone Arsenal* • Smallwood & Son Machine Co. • *Link Aviation, Inc.* • Bell Aircraft • *General Mills* • Elgin National Watch Co. • *U. S. Naval Gun Factory* • Grimes Manufacturing Co. • *Texas Instruments, Inc.* • McDonnell Aircraft Co. • *American Machine & Metals* • Stromberg-Carlson Co. • *Hamilton Standard* • U. S. Gauge Co. • *Western Gear Works* • Schlumberger Well Surveying Corp. • *Douglas Aircraft.*

THE HAMILTON TOOL COMPANY • 832 SOUTH NINTH STREET • HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 27


900-ton giants t
NIAGARA

s to 15-ton work-horses

AMERICA'S MOST MODERN LINE OF PRESS BRAKES OFFERS YOU THE MOST

Take your pick! 76 standard models! Niagara offers you any press brake you need . . . and the most modern features in whichever one you choose. Like its complete, companion line of power squaring shears, the Niagara line of press brakes is America's most advanced in engineering and performance.

Collectively, Niagara Press Brakes embody an unequalled array of features to boost production, simplify operation, improve quality and cut costs:

- **Power clutch** — electro pneumatic friction, low inertia, no adjustments needed.
- **Power brake** — spring applied, air released, synchronized with clutch.
- **Power treadle** — new ease of command, no operator fatigue.
- **Ram micro-jogs smoothly, softly** to a layout line — even through work at full capacity . . . stops on a dime.
- **Press type electric controls** — for greater safety.
- **Wrap around crown** — modern, clean sweep styling.
- **Adjustable clutch torque capacity** controlled by varying air pressure to protect machine and dies against overload.
- **Heat treated and hardened steel gearing** operate in bath of oil — no open gearing.
- **Laminated non-metallic ways** — minimize wear, prevent scoring.
- **Anti-friction bearings** throughout intermediate and high speed shafts.
- **Front operated adjustable speed drives** and two-speed transmissions.
- **New, heavy duty, front operated back gages** — power or manual.
- **Self-locking power ram adjustment** with positive stops against overtravel. Direct reading counter type indicators.
- **Heat treated alloy adjusting screws** with ball joints and replaceable seats.
- **Centralized pressure lubrication** delivers oil to all main bearings, connection bearings and gibs.

Make a complete check of all the Niagara features that pay big dividends in press brake performance. Write for illustrated Bulletins 89 and 90 containing complete details and specifications on this great line of press brakes (bending capacities from 16 ga. to 1" and bed lengths from 4' to 30').

NIAGARA press brakes

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N.Y.

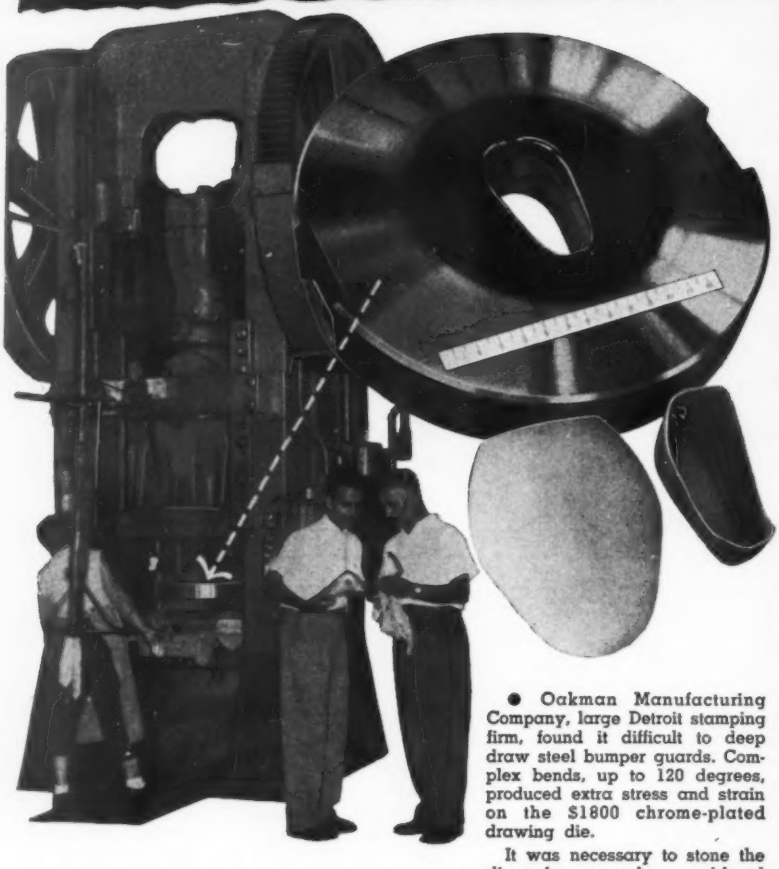
DISTRICT OFFICES: Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia

Distributors in principal U. S. cities and major foreign countries

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

CIRCLE INFORM-A-GRAM KEY NO. 29

TALIDE DIE SAVES OVER $20,000 DRAWING AUTO BUMPER GUARDS



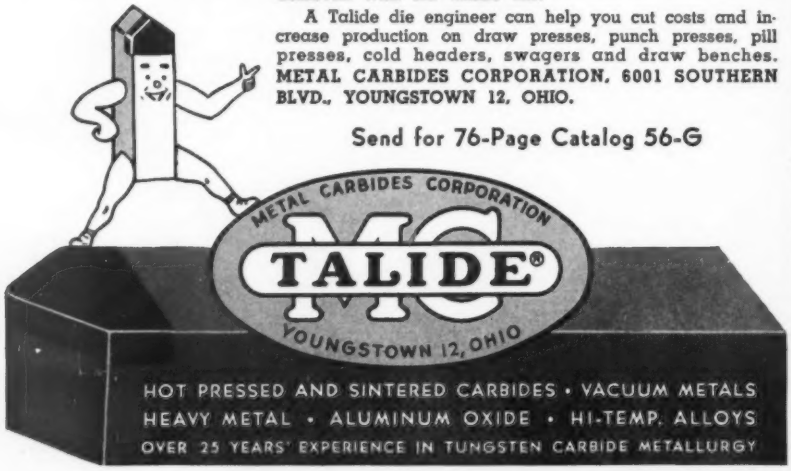
● Oakman Manufacturing Company, large Detroit stamping firm, found it difficult to deep draw steel bumper guards. Complex bends, up to 120 degrees, produced extra stress and strain on the S1800 chrome-plated drawing die.

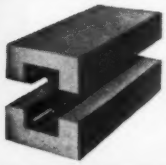
It was necessary to stone the die surface every hour, and hand polish entire drawing surface after each day's run. The steel die had to be completely reworked and a new chrome-plated surface added after drawing 60,000 parts. Downtime for maintenance made it difficult to maintain production schedules. Maintenance costs soared.

A Grade C-80 Talide die ($2700) was installed 8 months ago. To date it has drawn over 800,000 guards with no wear in evidence. Downtime for die maintenance has been greatly reduced. A buffing operation (25c per piece), previously required, has been entirely eliminated because of the smoother, brighter, more durable finish achieved with the Talide die.

A Talide die engineer can help you cut costs and increase production on draw presses, punch presses, pill presses, cold headers, swagers and draw benches. **METAL CARBIDES CORPORATION, 6001 SOUTHERN BLVD., YOUNGSTOWN 12, OHIO.**

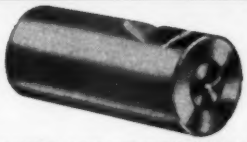
Send for 76-Page Catalog 56-G


METAL CARBIDES CORPORATION
MC
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY



SWAGING DIES

Leading Fountain Pen Manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.

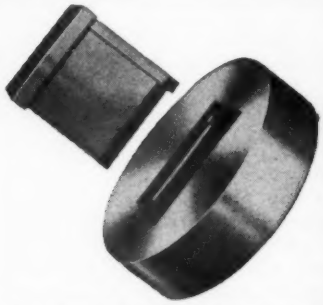


HEADING AND EXTRUSION DIES

Cold heading ¼" C-1008 rivets, TALIDE dies produced 11,200,000 pieces, other carbide dies only 3,500,000.

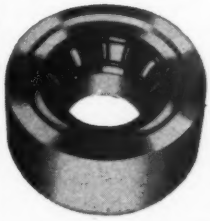
CURLING ROLLERS

TALIDE Curling Rolls last 65 times longer than steel rolls on beverage can forming operation.



BLANKING AND FORMING DIES

70 times more paper discs blanked out with TALIDE—over hard alloy die.

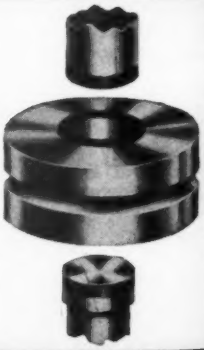


SHEET METAL DIES

137,000 hi-alloy steel pressure vessels drawn with TALIDE against only 7,900 with steel dies previously used.

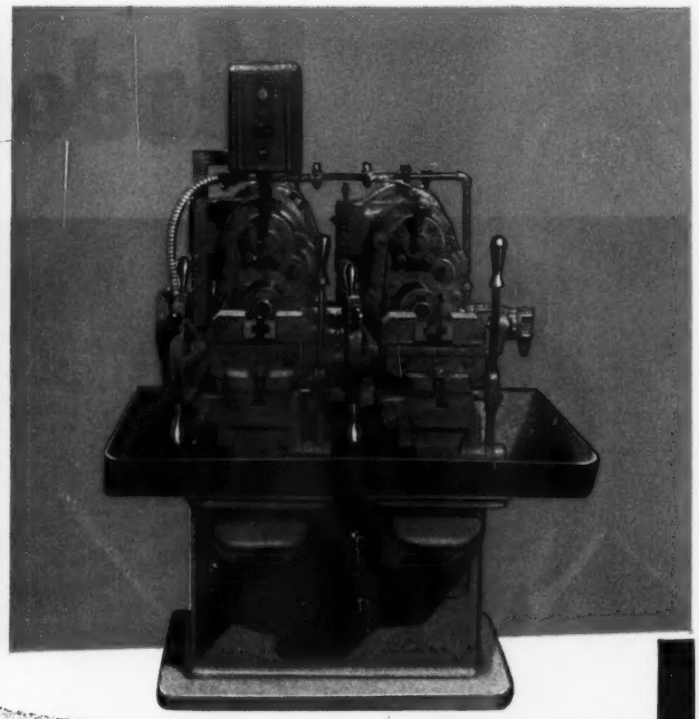
POWDERED METALLURGY DIES

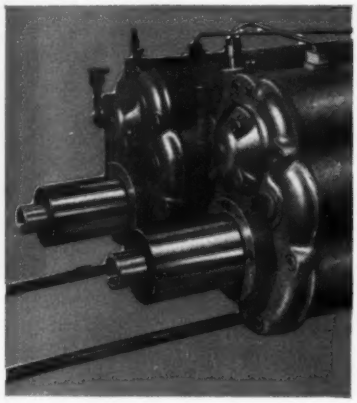
Compacting highly abrasive chemical powders, TALIDE pill dies last 4 months, steel dies wore out in 6 hours.



CIRCLE INFORM-A-GRAM KEY NO. 30

DOES
YOUR
PRODUCTION
REQUIRE
HORIZONTAL
TAPPING?





HIGH PRODUCTION
AND FLEXIBILITY
FOR LOW-COST OPERATION

Flexible operation assured throughout range of tap sizes by ease of speed changes.

Speedier production — resulting from reversing speed of 150% of tapping speed for all ranges.

Simple, easy set-up and operation, with fast, accurate performance.

Repair parts — readily available — no factory service men needed for repairs.

...then you need Cost-Cutting

Custom-Designed CAPCO 2-SPINDLE

HORIZONTAL TAPPER

Now available at a standard machine-tool delivery time and price!

The only machine of its type now available for tapping pipe or tubular ferrous and non-ferrous metals too long to handle vertically, this "CAPCO" 2-Spindle Horizontal Tapper is designed and built for years of rugged service. *High production* is one of the outstanding features of the machine, operating at tapping speeds from 60 to 240 r.p.m., and to a maximum depth of 4". Ample power for toughest jobs is provided by the 5 h.p. motor. Mechanically operated jaw clutches assure performance to spare for driving all taps, right or left hand threads, up to and including 1⅞". Tough, hardened steel two-jaw vises accommodate work up to 2⅛" in diameter, holding without distortion.

Designed in a production plant for production operations, the new "CAPCO" 2-Spindle Horizontal Tapper is available at a price no higher than for equipment ordinarily sold on a standard machine time delivery basis.

WIRE — PHONE — WRITE —
today for complete details and specifications.

CAPCO PRODUCTS DIVISION

P.O. Box 507 Columbus 16, Ohio Phone: AMherst 8-3581

CIRCLE INFORM-A-GRAM KEY NO. 31

Modernize FOR

Productivity: A 22.250" P.D., 4 D.P. steel gear is cut in 2½ hours on a modern Fellows 36-Type Gear Shaper. Older machine required ten hours.

THE PRECISION LINE

LOWER COSTS

with new FELLOWS 36-TYPE Gear Shapers

Two new Fellows 36-Type Gear Shapers can produce more than three or four older machines... and give you extra production versatility, too. In many plants, new Fellows production equipment has lowered unit production costs by more than half, earned back its cost in three years or less.

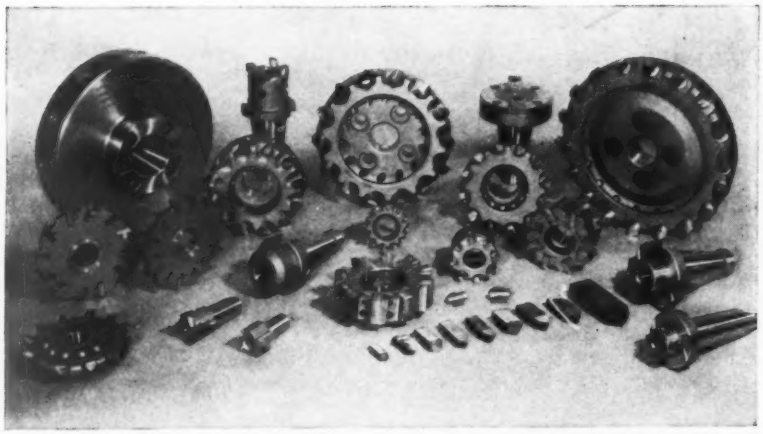
Fast, accurate, and simple to set up for a wide range of jobs up to 36″ P.D., the Fellows 36-Type is ideal for short runs of varied parts as well as for long runs. Rigid, husky construction permits close tolerances on internal or external spurs, helicals, and herringbones, as well as an almost unlimited variety of cams, splines, and other non-involute shapes. Cutter speeds range from 18 to 300 strokes per minute.

Why not ask a Fellows Representative to *show* you in your plant where you can cut production costs with newer machines? Write, wire, or phone any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Michigan
150 West Pleasant Ave., Maywood, New Jersey
5835 West North Ave., Chicago 39, Illinois
6214 West Manchester Ave., Los Angeles 45

Fellows *Gear Production Equipment*

CIRCLE INFORM-A-GRAM KEY NO. 33



Milling Cutters — End Mills — Blades — Boring Tools — Arbors — Flywheels

These Lovejoy Products can help you Cut Costs!

The entire line of Lovejoy Milling Cutters and Accessories is designed to aid you in getting better production at less cost.

If you are not now using Lovejoy products, we invite you to do so at first opportunity.

Lovejoy precision-engineered tools include:

Inserted-tooth milling cutters (face, side, end, slotting and boring) which feature husky, forged steel housings; exclusive Lovejoy "positive-locking" blade assembly; a variety of dozens of models and hundreds of sizes.

Blades: H.S.S., Vasco Supreme and carbide. These are interchangeable over a wide range of housing sizes, and Type "A" face milling blades will fit any standard Lovejoy Type "A" cutter of 4½" to 24" dia. All Lovejoy blades are carried in stock, ready for immediate shipment. Special cutters are a Lovejoy specialty.

NEW

Lovejoy announces the "SHEARJOY", a completely new line of inserted-tooth face mills whose shearing action removes metal at record rates. H.S.S., and Vasco Supreme blades are available.

"Operator reports . . . best milling cutter he ever used on steel." "Prospect buys *Shearjoy* on the spot, after demonstration." "Customer reports 4½" feed at 52 RPM on tough die steel." "Used for 3 shifts without resharpening and without coolant."

Catalogs — include: "Face Mill Catalog No. 31; Side Mill Catalog No. 32; Type "S" Bulletin; Arbor Catalog No. 33; "Speed and Feed" Calculator. Write today for copies desired.

LOVEJOY TOOL COMPANY, INC.
Springfield, Vermont, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 34

"Commendable Comments"

"One might say that metallurgy changes from an art to a science when we begin to apply basic principles to the design practices and to the interpretation of results. It is like comparing a political government ruled by the whims of a dictator to one ruled by law and order under a constitution. Basic laws are immutable and invariant, the same yesterday, today, and tomorrow. While this may sometimes result in frustration, as when we try to circumvent them, mostly it gives us confidence and assurance that if we are constant in using good practice, we will obtain consistently good results."

—Clarence E. Sims, Battelle Memorial Institute, before 12th Annual Technical and Operating Conference, Steel Founders Society of America.

◆

"Consider the infinite variety of tasks to be performed in the world today. For the most part, they can be accomplished only through that unique human correlation of an elaborate brain, with great manual dexterity. . . . The use of unskilled workers has been reduced from 36% to less than 20%, whereas the use of semi-skilled workers has increased from 15% to almost 23%. . . . We can accept the general effect of these growth patterns, and predict that an enormous increase in productive capacity must evolve within the foreseeable future. The total labor force will be expanded by reason of this increase in capacity. In addition, upgrading of worker skills will be essential for the more technically complex future processes."

—Andrew A. Kucher, vice president—engineering and research, Ford Motor Company, addressing annual meeting of Society of Automotive Engineers in Detroit.

◆

"Electromation (a word coined to show that electrical energy is necessary to power automation) is not a luxury any more. Rather it is a basic tool of business and production. . . . It's no longer a question of whether or not to get aboard, but how much and how soon."

—Tomlinson Fort, vice president in charge of apparatus division, Westinghouse Electric Corporation, speaking at Third National Industrial Electric Heating Conference at Cincinnati.

Once around--and we'll have shipped your warehouse order for Timken® 52100 Tubing

THE hour hand on that watch goes around once in twenty-four hours. And before it gets completely around, we can ship your less-than-mill quantity order of Timken® 52100 tubing. We can save you time because we carry 101 sizes of 52100 tubing in our mill warehouse.

And you'll save money, too, with Timken 52100 tubing—by substituting it for costlier alloy steels. You get a steel that's through-hardened in moderate sections, that can be hardened to file hardness or tempered back as you desire.

Many thousands of tons of Timken 52100 have been made into aircraft parts, ball bearing races, pump parts and plungers, collets, bushings, spindles, grinding machine parts and precision instruments.

You can rely on Timken 52100 steel. Our rigid quality control assures you uniformity from tube to tube, heat to heat, order to order. We pioneered 52100 tubing in America, and we're the only company that makes 52100 steel in all three products—tubing, bars and wire.

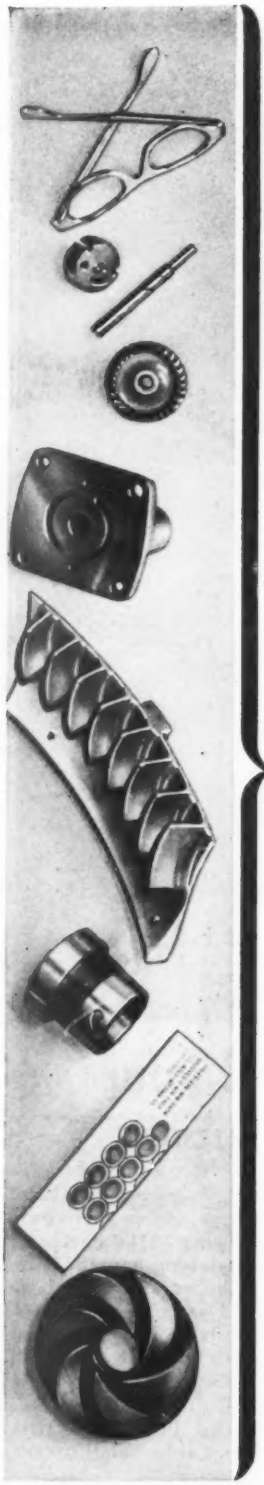
Give us 24 hours and we'll have your Timken 52100 tubing on its way to you. It's available in O.D.'s from 1″ to 10½″ and a wide variety of wall thicknesses. Write, phone or wire: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO".

TIMKEN *Fine Alloy* STEEL

TRADE-MARK REG. U.S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

CIRCLE INFORM-A-GRAM KEY NO. 35



A few examples of work produced on Gorton Pantographs at substantial savings in time and money

240 PIECES PER HOUR
This fuse part, of No. 1213 steel, has a serpentine groove with irregular radii. Two pantograph cutters rough out and the other two finish parts in pairs. Groove is .1903" wide, plus .0014", by .109" deep, plus .003". Finish: 35 mcr.

GORTON *Multiple Pantographing*

Volume Production • Precision Tolerances

Tool room accuracy with production line speed is characteristic of Gorton Pantographs. These versatile machines will turn out a dozen . . . or a million . . . finished pieces from one setting with no perceptible variation in required tolerances. From two to six different operations can be performed at each setting with all operations completely automatic within the cutting cycle. In fact, output is limited only by the capacity of the cutter. Spindles turn at 900 to 45,000 RPM providing infinitely variable cutting speeds and feeds.

Shape of part matters little. Two or three-dimensional cutting can be performed on flat, cylindrical, spherical, square or irregularly shaped work. 16 Pantograph models cover a wide range of applications in profiling, grooving, slotting, milling, chamfering, graduating, counter boring, die sinking, mold making, routing, engraving, grinding, burnishing and etching. Models provide manual, semi-automatic and fully automatic cycling. Custom built.

Write for Bulletin 1580-1-1204

New P1-2 heavy-duty model with 3/8" spindle capacity and 1/2 HP motor available

GORTON

GEORGE *GORTON* MACHINE CO.

1204 RACINE STREET • RACINE, WISCONSIN

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

A 8846-1PR

CIRCLE INFORM-A-GRAM KEY NO. 36

Huge Face Mill...

- *two Wesson cutters remove aluminum chips at rate of one ton in four minutes*
- *driven by 1000-hp motors*

...scalps at 11,800 sfpm

Demand for aluminum foil has increased so rapidly that producers have not had a chance to catch up with their production problems. One of the bigger foil producers decided there never would be enough time to catch up and gave one big problem to the Consolidated Machine Tool Div., Farrel-Birmingham Co., Inc.

The Problem

Before aluminum is cold-rolled into foil, billets weighing up to seven tons have to be face milled on both sides to remove scale and imperfections. Conventional equipment can mill only one side at a time, the billet being flip-flopped between cuts. This is costly. A scratch in a finished surface can ruin a mile of foil. Other problems are: slow metal removal; cutter grinding and setup take too long.

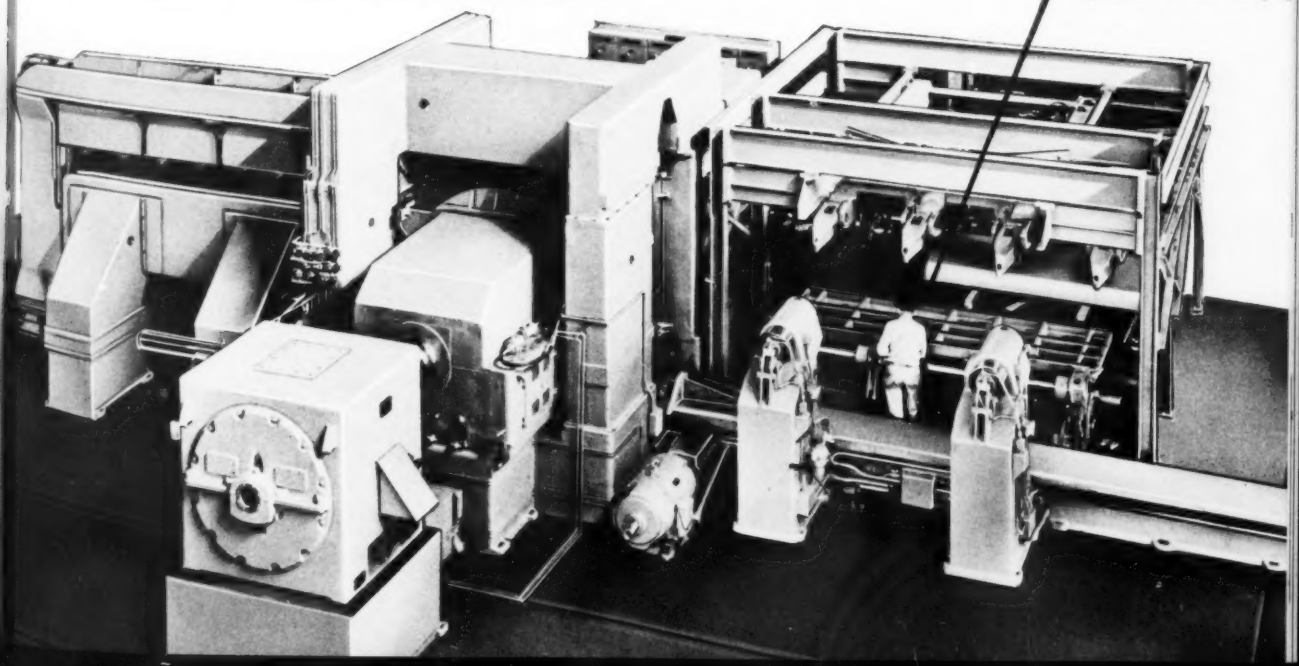
The Solution

A new machine to face both sides of the billet at the same time, eliminate flip-flopping and apply 1000 hp to each of two huge cutters. Now needed was a new cutter design. For this phase of the project, they called in Gerry Bogner, one of Wesson Company's top milling-cutter engineers.

The Cutter

Under Bogner's direction, Wesson engineers, too, departed from regular methods in the cutter design. Major objectives were high strength (cuts of 5/8 inch at feeds up to 360 ipm), ease of grinding and ease of setup. Investigation showed the last two requirements to be tied together. The solution was to insert Wessonmetal blades in standardized magazines that can be removed from the cutter body. Setup and grinding angles are machined on the magazines, minimizing grinding and setup time (see next page). Required strength was achieved by a combination of good materials, design and workmanship.

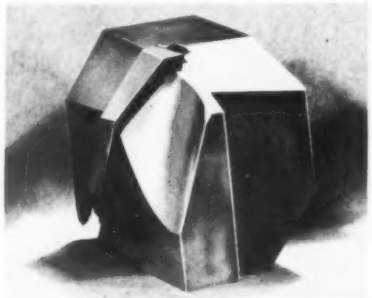
(*continued on next page*)



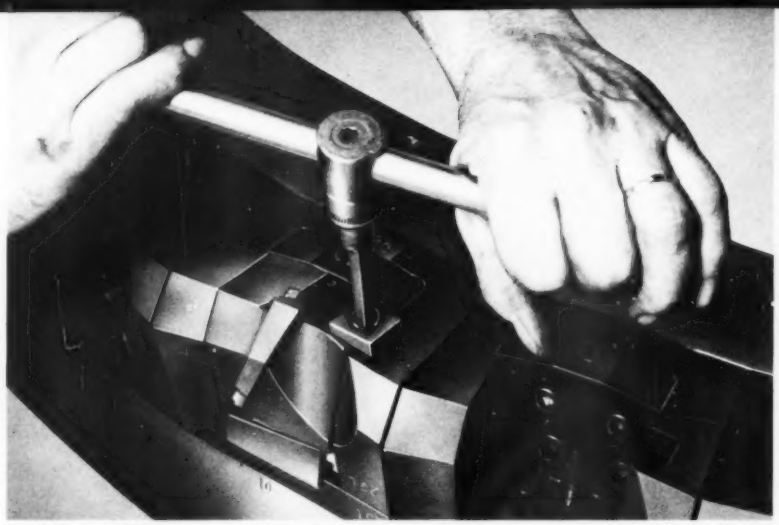
TOOL NEWS carbide

Huge Milling Cutter

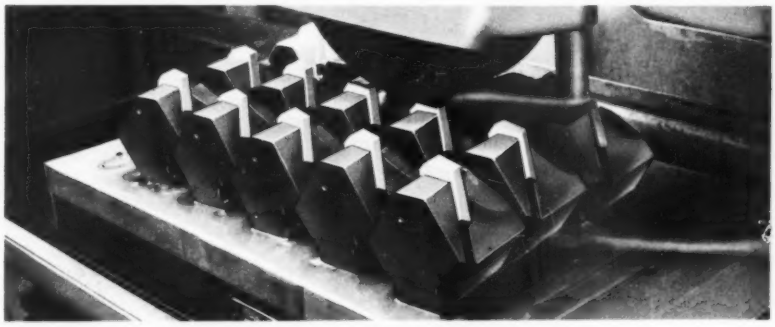
(continued from previous page)



BLADE MAGAZINES themselves act as grinding fixtures through an intricate combination of machined compound angular surfaces which also provide the necessary clearance, and axial and radial rake angles. Magazines are completely interchangeable.



WHEN INSERTED in the cutter body, the magazines automatically preset all cutting edges without any need for gaging or indicating for runout. Each magazine is held in place, against adjustable wedges in the blocks, by a single wedge that exerts locking forces simultaneously in three directions. Tightening the bolt draws the wedge into position to securely hold the magazine. When the bolt is loosened, the wedge is forced out of its slot to free magazine. TIME FACTOR—45 minutes vs. the former 15 hours for setup.



MAGNETIC CHUCK of ordinary surface grinder holds several magazines with the Wessonmetal blades in place. Because proper angles are machined on the magazines, sharpening of compound angles on the blades is no problem. Grinding is continued until all blades of setup are sharp. TIME FACTOR—2 hours vs. the former 100 hours.

Keeping Up to Date?

Some keen tool designers knew that throw-aways on boring tools could minimize maintenance problems while letting them design the one best tool for the job. The result—special micro-adjustable tools like those at the right.

With this one idea, the job is half done. With the suggestions in

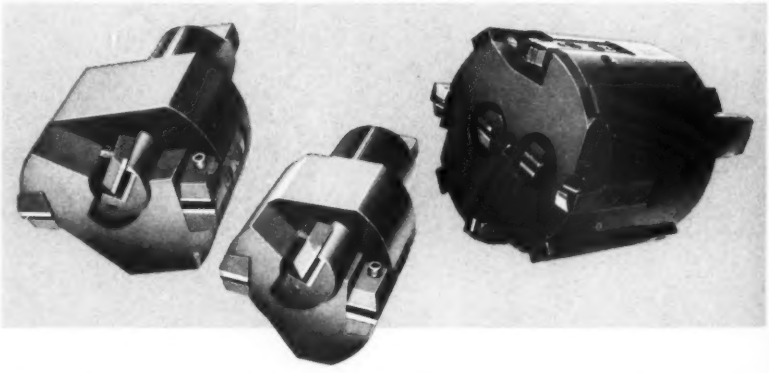
Bulletin #MB-157

your job may be all done! This bulletin is continually updated so request it again if you haven't seen a recent copy.

tools Wesson carbide Wessonmetal

WESSON COMPANY, DEPT. AD
1220 Woodward Heights Blvd., Detroit 20, Mich.
IN CANADA:
WESSON CUTTING TOOLS, LTD.
93 Judge Road, Toronto 18, Ontario

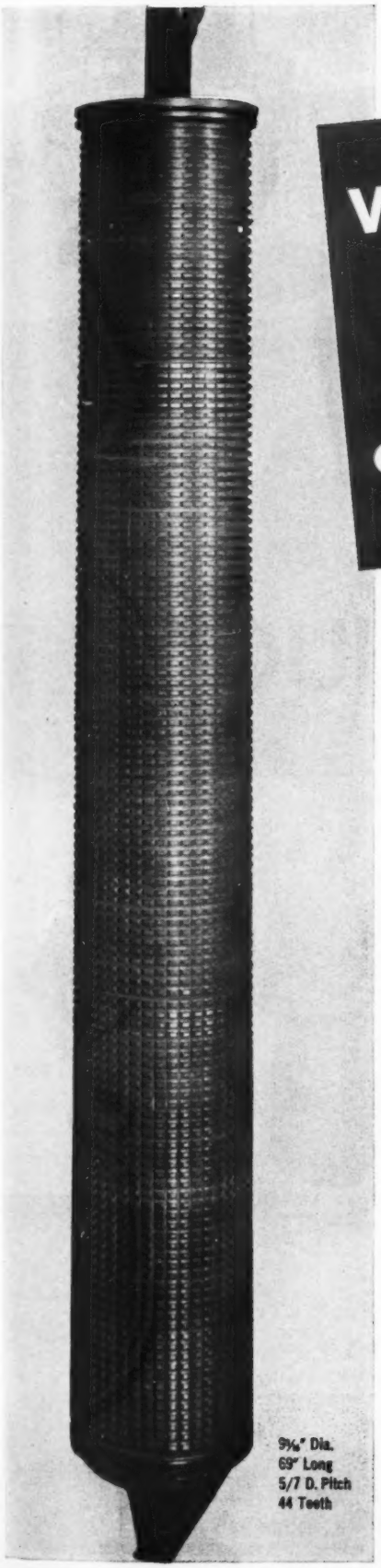
Special Boring Quills Use Throw-Away Inserts



All of the outside-cutting inserts used on these three special boring quills can be adjusted radially and axially. For the two left-hand quills, this means that boring and facing cuts can be made within close tolerances—*for each cut and with relationship to each other.* Position of the spot-facing cutter is not critical in this tool.

The quill at the right is designed to perform four operations on *two different parts.* The operations are: bore, counterbore and turn two outside diameters. Different parts are machined by interchanging individual toolholders with the correct size inserts.

Use of throw-away inserts has made practical the correct design for these tools. *Optimum design* did not have to be compromised to allow for easy grinding and maintenance.



Who Would You Trust to HEAT-TREAT a BROACH Like This?

At the time this Red Ring Naloy Broach* reached heat-treat, about $5,000.00 had been spent on it. One mistake during the heat-treat operation could reduce it to scrap. In addition, the resulting delay might seriously disrupt our customer's production schedules.

These are only two of the reasons why Red Ring Broaches are heat-treated in our own plant under control of our own metallurgists. Here we have equipment especially designed and selected for just this type of work. Here we have an organization with a background of know-how that has been building up for the last 30 years.

Complete control over every production operation by men who KNOW broaches, gives the Red Ring Broach that extra precision—that extra service life—that added economy for the user.

See the cover illustration of American Machinist, November 4 issue.

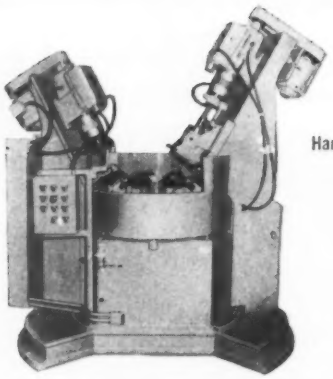
7983

NATIONAL BROACH & MACHINE CO.

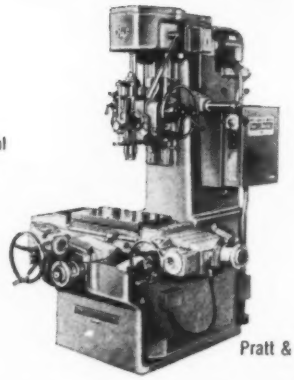
5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

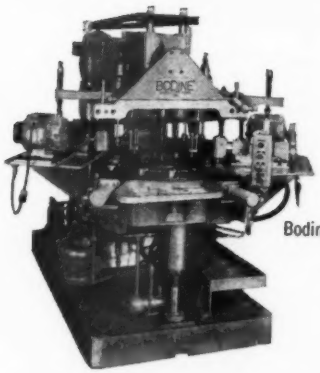
CIRCLE INFORM-A-GRAM KEY NO. 39



Hartford Special



Pratt & Whitney

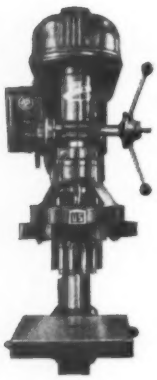


Bodine

17 LEADERS

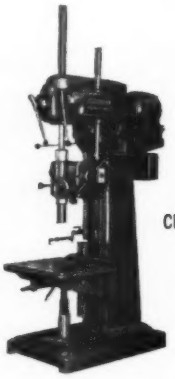
Stake their reputations on

JACOBS CHUCKS

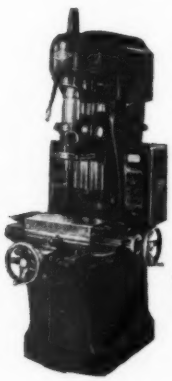


U. S. Drill Head

Greenlee

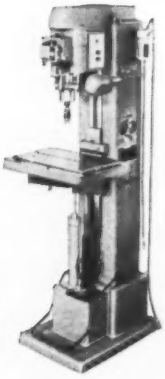


Cleereman

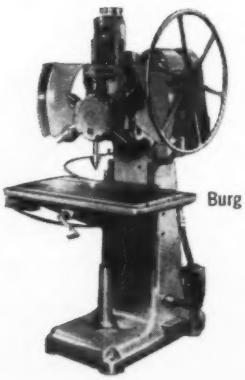


Moore

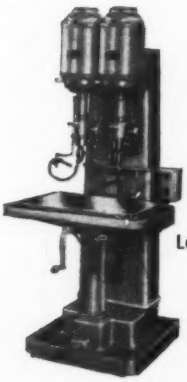
Dumore



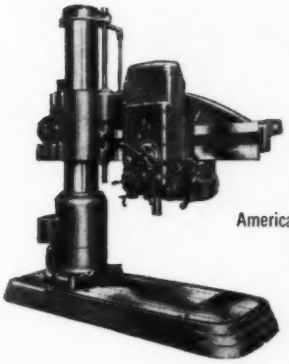
Snow



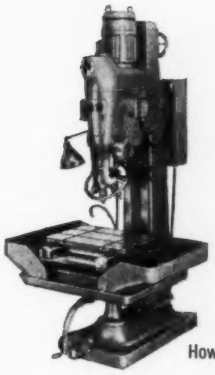
Burg



Leland-Gifford



American

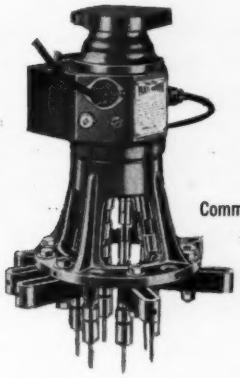


Howe & Fant

Fosdick

Chicago Quadrill

Jarvis



Commander

Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

The Jacobs Manufacturing Company
West Hartford, Connecticut

Jacobs CHUCKS

CIRCLE INFORM-A-GRAM KEY NO. 41

WHY USE TWO··

DRILL CHAMFER
DRILL C'BORE
DRILL DRILL
DRILL REAM
A FEW EXAMPLES OF HOW MOHAWK SUBLANDS MORE ECONOMICALLY ACCOMPLISH TWO OR MORE DIAMETERS WITH ONE TOOL IN ONE PASS
Let Mohawk prove to you that a Subland is the most efficient and economical tool to use for multiple drilling operations. Check your maintenance costs along with the number of pieces per grind. Mohawk will guarantee you a savings.

WHEN ONE WILL DO!

Why use two—or more standard twist drills to accomplish a multiple diameter cavity when *one* Mohawk Subland tool will do the job in *one* pass... and, do it more efficiently, accurately and economically!

Why overload yourself with an assorted inventory of ordinary drills when you can save time, money and equipment by combining your requirements in a few versatile, accurate Mohawk Subland tools.

One Mohawk Subland tool will outwork and outlast dozens of ordinary drills. Because Sublands are infinitely accurate and they can be repeatedly reground (in your shop) without losing their concentricity.

Examine your hole costs, then see for yourself how many places a Mohawk Subland could easily and effectively handle the job and reduce your hole costs all along the line.

Normal Delivery on MOHAWK SUBLANDS Size Optional – 14 Days from receipt of order!

Write... Wire... Phone Today

and let a Mohawk engineer prove just how easy it is to save your time—money and tools through the use of Mohawk Sublands.

YOURS FOR THE ASKING

Request your copy of the new Mohawk brochure entitled "Why Use Two . . . When One Will Do". You'll find it's loaded with interesting ideas plus dozens of suggestions that will save you drilling dollars.

world's largest producers of Sublands

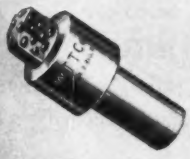
Mohawk TOOLS, Inc.

Montpelier, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 42

RADIUS FORMING TOOLS

"TRU-LINE" PROFILE DRESSING TOOLS



IMPREGNATED DRESSING TOOLS

STANDARD DRESSING TOOLS

"TRU-THREAD" THREAD DRESSING TOOLS

DIAMOND GRIT TOOLS FOR THREAD DRESSING

INDUSTRIAL DIAMONDS

Original Diamond Grit Tools Offer Good Savings in Many Uses

Grit-type diamond tools, originated in our laboratories and brought to their highest development under the name Tru-Grit®, have definite characteristics which result in big savings in many applications.

Tru-Grit® Diamond Tools are built with a unique saturation content of whole, fine quality, natural diamonds carefully graded for uniformity in size and shape and uniformity in cutting power, wheel finish and product finish.

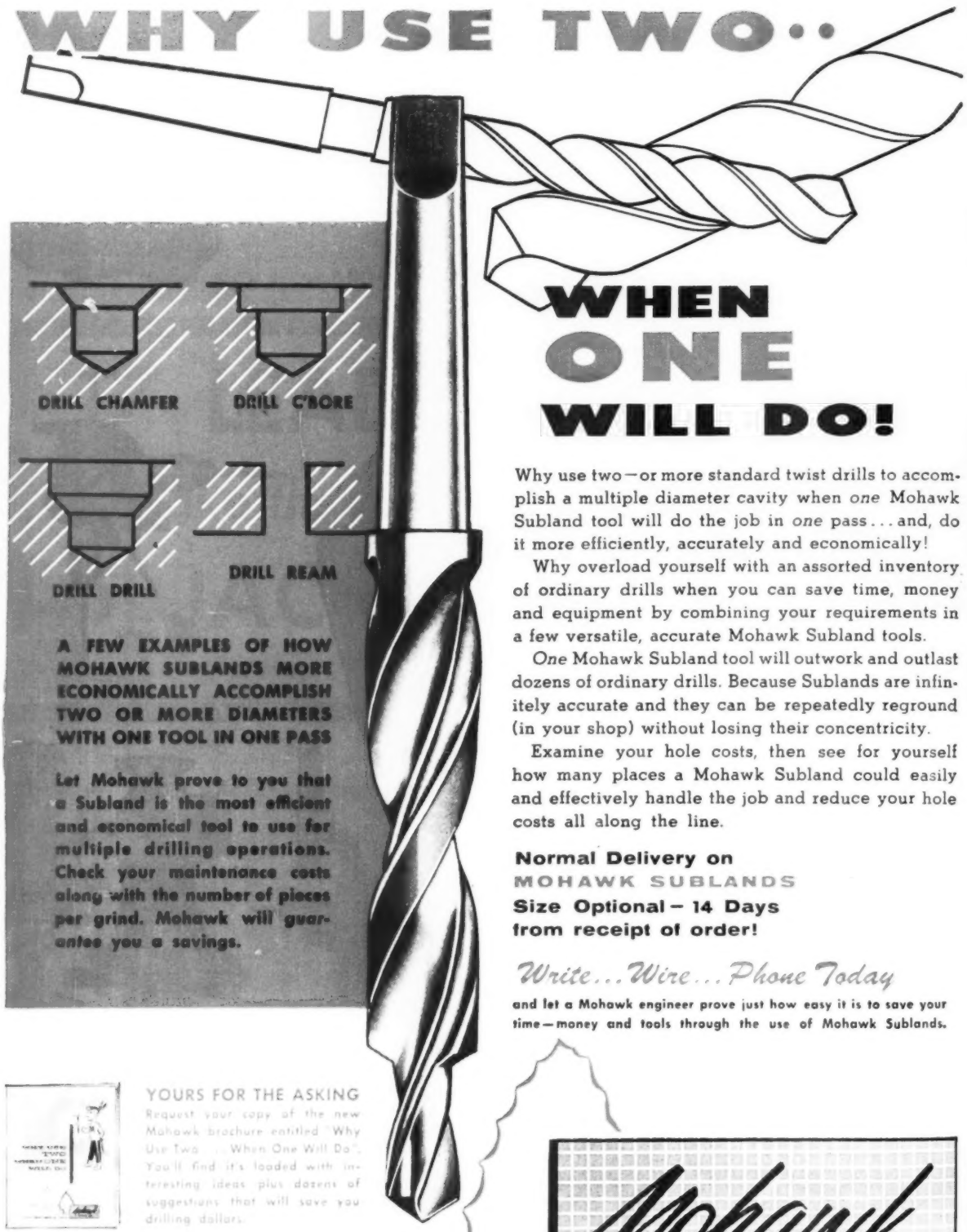
With about half the infeed and twice the traverse rate of conventional single point diamond tools, they produce satisfactory finishes over a much longer tool life.

Normally, they need little or no attention and their notable successes include uses in automated processes. Where logically applied they deliver important savings in down time, wheel cost, diamond cost and production cost per piece.

The specialized experience of our engineers is freely at your service and your inquiries are invited.

WHEEL TRUEING TOOL COMPANY
37-3200 W. DAVISON AVE., DETROIT 38, MICHIGAN
ESTABLISHED 1910
Southwestern Plant: Dallas, Texas
Distributors in Principal U.S. Cities—Agents Throughout the World
WHEEL TRUEING TOOL COMPANY OF NEW JERSEY
33 West Street, Bloomfield, N. J.
WHEEL TRUEING TOOL COMPANY OF CALIFORNIA
5560 Alhambra Ave., Los Angeles 32, California
WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.
575 Langlois Ave., Windsor, Ont.

WHY USE TWO..



WHEN ONE WILL DO!

Why use two—or more standard twist drills to accomplish a multiple diameter cavity when *one* Mohawk Subland tool will do the job in *one* pass... and, do it more efficiently, accurately and economically!

Why overload yourself with an assorted inventory of ordinary drills when you can save time, money and equipment by combining your requirements in a few versatile, accurate Mohawk Subland tools.

One Mohawk Subland tool will outwork and outlast dozens of ordinary drills. Because Sublands are infinitely accurate and they can be repeatedly reground (in your shop) without losing their concentricity.

Examine your hole costs, then see for yourself how many places a Mohawk Subland could easily and effectively handle the job and reduce your hole costs all along the line.

A FEW EXAMPLES OF HOW MOHAWK SUBLANDS MORE ECONOMICALLY ACCOMPLISH TWO OR MORE DIAMETERS WITH ONE TOOL IN ONE PASS

Let Mohawk prove to you that a Subland is the most efficient and economical tool to use for multiple drilling operations. Check your maintenance costs along with the number of pieces per grind. Mohawk will *guarantee* you a savings.

Normal Delivery on
MOHAWK SUBLANDS
Size Optional – 14 Days
from receipt of order!

Write... Wire... Phone Today

and let a Mohawk engineer prove just how easy it is to save your time—money and tools through the use of Mohawk Sublands.

YOURS FOR THE ASKING

Request your copy of the new Mohawk brochure entitled "Why Use Two . . . When One Will Do". You'll find it's loaded with interesting ideas plus dozens of suggestions that will save you drilling dollars.

world's largest producers of Sublands

Mohawk TOOLS, Inc.
Montpelier, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 42

RADIUS FORMING TOOLS

"TRU-LINE" PROFILE DRESSING TOOLS

IMPREGNATED DRESSING TOOLS

STANDARD DRESSING TOOLS

"TRU-THREAD" THREAD DRESSING TOOLS

DIAMOND GRIT TOOLS FOR THREAD DRESSING

INDUSTRIAL DIAMONDS

Original Diamond Grit Tools Offer Good Savings in Many Uses

Grit-type diamond tools, originated in our laboratories and brought to their highest development under the name Tru-Grit®, have definite characteristics which result in big savings in many applications.

Tru-Grit® Diamond Tools are built with a unique saturation content of whole, fine quality, natural diamonds carefully graded for uniformity in size and shape and uniformity in cutting power, wheel finish and product finish.

With about half the infeed and twice the traverse rate of conventional single point diamond tools, they produce satisfactory finishes over a much longer tool life.

Normally, they need little or no attention and their notable successes include uses in automated processes. Where logically applied they deliver important savings in down time, wheel cost, diamond cost and production cost per piece.

The specialized experience of our engineers is freely at your service and your inquiries are invited.

WHEEL TRUEING TOOL COMPANY

37-3200 W. DAVISON AVE., DETROIT 38, MICHIGAN

ESTABLISHED 1910

Southwestern Plant: Dallas, Texas

Distributors in Principal U.S. Cities—Agents Throughout the World

WHEEL TRUEING TOOL COMPANY OF NEW JERSEY
33 West Street, Bloomfield, N. J.

WHEEL TRUEING TOOL COMPANY OF CALIFORNIA
5560 Alhambra Ave., Los Angeles 32, California

WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.
575 Langlois Ave., Windsor, Ont.

DESIGNING PARTS FOR COLD AND HOT HEADING, First Edition. Prepared and published by Industrial Fasteners Institute, 1517, Terminal Tower, Cleveland 13, Ohio, 1958. 96 pages, $2.

A compilation of 60 design studies shows how hot or cold heading saved money, simplified production, or improved tolerances. Many of the parts described, pictured, and drawn can be used for assemblies other than those originally designed for, "as is" or with slight modification. Representative chapter headings include: How Heading Produces Better Parts at Lower Cost, Designing Parts for Heading, Designing for Secondary Operations, Drawings and Specifications, and Effects of Electroplating on Dimensions. The book is well timed, insofar as being published right when interest in cold and hot heading is growing rapidly.

METAL CUTTING TOOL NOMENCLATURE. Published by the Metal Cutting Tool Institute, 405 Lexington Ave., New York 17, N. Y., 1957. 107 pages, paperbound, $4.50.

The book's title tells exactly what is covered in it — uniform nomenclature and definitions for metal cutting tools. It is the result of a project undertaken by the Metal Cutting Tool Institute, and fills a need for uniformity that has long been evident. Definitions, illustrations, and nomenclature are arranged in separate sections for the various classes of tools, such as twist drills, reamers, counterbores, taps, dies, milling cutters, gear generating tools, and broaches, for convenience in finding specific information.

TESTING SURFACE FLATNESS, Bulletin No. T-757. Published by Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill., 1957. 10 pages, $1.

A fast, precise method of measuring flatness, devised by Engis Equipment Co. and based upon the use of the "Microptic Testgraph," is discussed and illustrated in this bulletin. Readings of the Microptic Auto-Collimator are expressed in "topographic" curves with the Testgraph.

ESTIMATING MACHINING COSTS, by C. W. S. Parsons. Published by McGraw-Hill Book Co., 327 W. 41 St., New York 36, N. Y., 1957. 400 pages, $8.

Here is a new guide to making satisfactory estimates of the costs of machine tool operations. It is planned to show the reader how to study the engineering drawing of a particular workpiece and decide how it can be made; to make a breakdown analysis of the necessary operations and their elemental subdivisions, considering men, materials, tooling, and machines; and to put time and money values on the various factors contributing to the completion of the work.

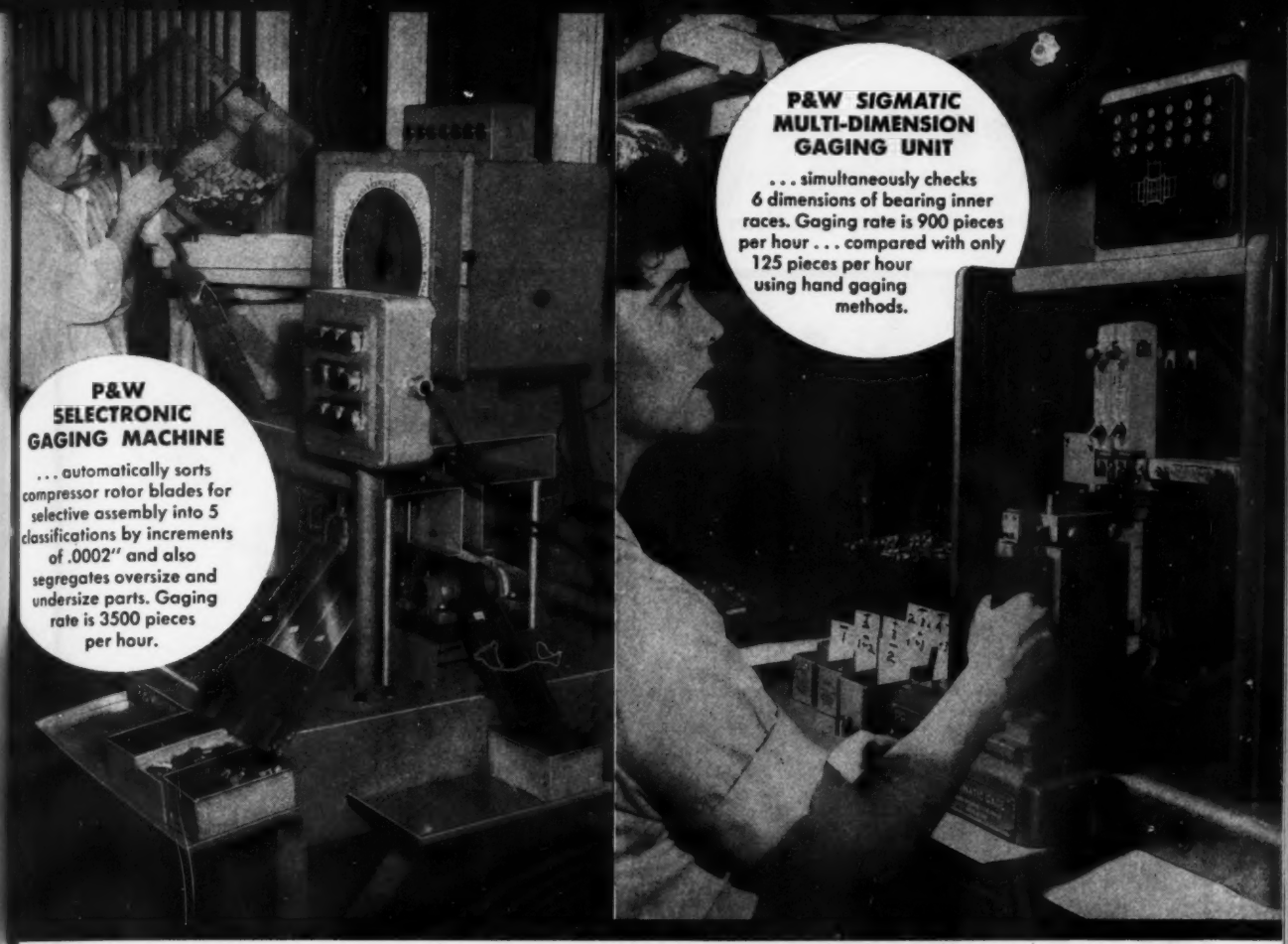
The cost estimator's job is analyzed to show the personal and technical background needed, and the tools and methods with which he works. Other fundamentals are covered in a discussion of the relation of cost estimating to engineering, and of such basic factors as tool life, machinability, and cutting tool materials.

After establishing this background. the author discusses in detail specific estimating problems in connection with such tools and operations as high speed drilling, radial drilling, milling machines, turret lathes. broaching machines, eccentric turning jobs, and others. Recent advances covered include ceramic. carbide and throwaway insert tools; tool life for minimum operating cost; and electronic computers and programmers.

HANDBOOK OF LAYOUT AND DIMENSIONING FOR PRODUCTION, by H. H. Katz. Published by The Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 1957. 479 pages, $15.

The author recognizes the fact that draftsmen can take on layout and dimensioning tasks, thus freeing the design engineers for more important engineering jobs. His book stresses practical, industry-defined layout and dimensioning requirements especially valuable for enabling draftsmen to do such work. Each step in product development, from technical sketch to final drawing, is illustrated and detailed in terms of procedures, principles, and theory involved. Each is related to the ultimate goal of efficient mass production. Topics covered include layout and dimensioning practices and applications; technical sketching; projective and descriptive geometry; discussions of the radius, circle, angle, and plane; datums; and elements of gaging.

CIRCLE INFORM-A-GRAM KEY NO. 45


P&W SIGMATIC MULTI-DIMENSION GAGING UNIT
. . . simultaneously checks 6 dimensions of bearing inner races. Gaging rate is 900 pieces per hour . . . compared with only 125 pieces per hour using hand gaging methods.
P&W SELECTRONIC GAGING MACHINE
. . . automatically sorts compressor rotor blades for selective assembly into 5 classifications by increments of .0002" and also segregates oversize and undersize parts. Gaging rate is 3500 pieces per hour.

BREAK 100% INSPECTION BOTTLENECKS

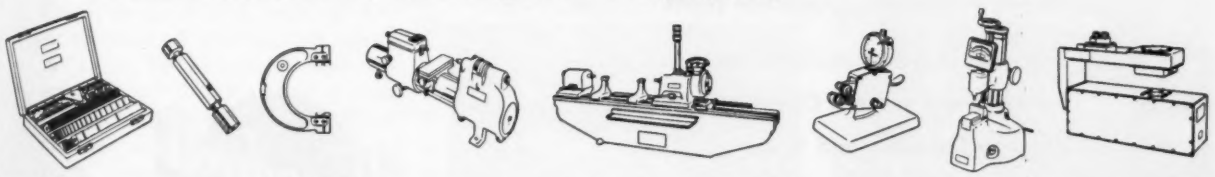
. . . WITH PRATT & WHITNEY "JOB-ENGINEERED" GAGING MACHINES

Performance levels in this space-travel era have created demands for much higher standards of precision. More and more components now require 100% inspection. In many plants, this has resulted in production bottlenecks at the inspection bench, and gaging costs have soared. Where parts must be classified for selective assembly, or where several dimensions of each part must be checked, the slow-down is intensified. Inspection costs sometimes exceed manufacturing costs.

Manufacturers are finding that Pratt & Whitney Automatic Gaging installations – like the examples above – provide the ideal solution. While each installation is job-engineered to provide the best possible gaging method, costs are kept to a minimum, because P&W Automatic Gaging Machines are assembled from standard, in-stock units. Sigmatic Gaging Machines, for example, are usually equipped with interchangeable gage tooling for fast, easy change-over from one part to another.

If the components you produce require 100% inspection, P&W Automatic Gaging can help you eliminate inspection bottlenecks and reduce gaging costs.

Send now for complete case-history reports on the 2 installations shown above and for fully descriptive product literature. Pratt & Whitney Company, Inc., 15 Charter Oak Blvd., West Hartford, Conn.



DARD MEASURING MACHINES . . . COMPARATORS . . . AUTOMATION AND CONTINUOUS GAGES . . . GAGE BLOCKS . . . CONVENTIONAL GAGES . . . SUPERMICROMETERS

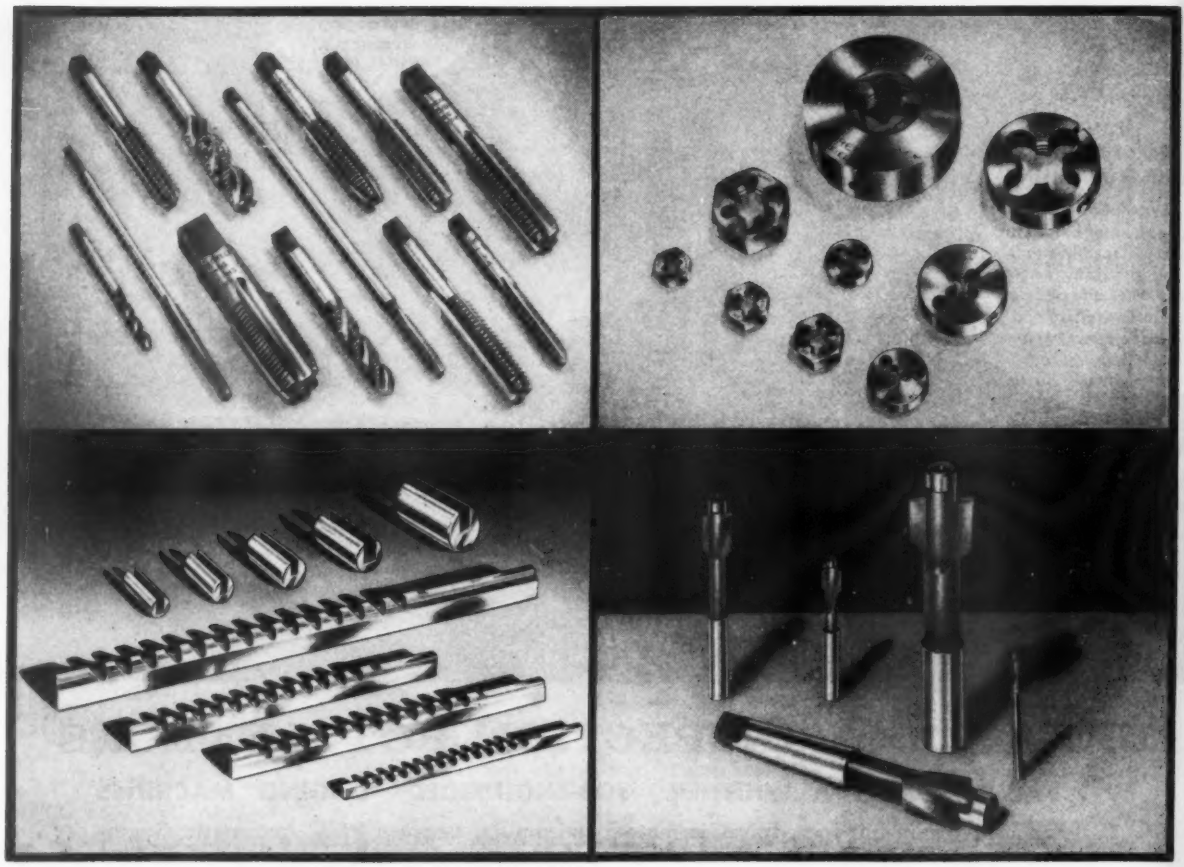
PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 45

THREADWELL CUTTING TOOLS



FOR EVERY APPLICATION

Regardless of application Threadwell has the right cutting tools for the right job. Proof of their superior quality and accuracy is evidenced in their performance. Why not experience the confidence all Threadwell users enjoy and include Threadwell in your production plans . . . now.

See your Threadwell distributor
for the finest in Taps, Dies, Counterbores,
Keyway Broaches *and Gages.*

Threadwell

INDUSTRIAL DISTRIBUTORS THE RIGHT HAND OF PRODUCTION

*'58

THREADWELL TAP & DIE COMPANY
Greenfield, Mass., U.S.A.

CIRCLE INFORM-A-GRAM KEY NO 46

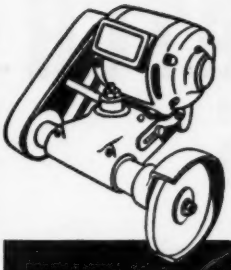
Simple, Easy Way to Do Spark Testing

Spark testing steel is a common occurrence in many steel warehouses, automotive plants and large stock rooms of industrial manufacturers. It is by this method that much of the steel used today is graded and selected for further processing.

One of the easiest ways to do this is to use a hand grinder. It is easy to handle, light in weight and powerful enough to throw a sufficient spark stream to instantly establish the grade of steel tested. Compact size makes storage no problem. Or, it might be used for other work, such as deburring, filing, smoothing weld seams, cleaning castings or for internal grinding.

The hand grinder used in the steel bin above is the Series 9, Dumore Hand Grinder. This handy tool was especially developed by Dumore to handle such plant jobs as spark testing. While it can be used for a great many other grinding jobs, its power-packed performance and perfect light-weight balance makes it ideal for this work. The ¼ hp fan-cooled, universal motor develops 15,500 rpm and swings ⅛" to 2-5/16" wheels. Extension arbor and ¼" chuck permit a wide range of work uses, both internal and external, with mounted wheels and burrs. Although powerful enough to handle the tough jobs, it weighs only 7½ lbs. For further information on this and other job-proved Dumore hand grinders for production, maintenance or tool room work, write to The Dumore Company, 1304 Seventeenth Street, Racine, Wisconsin.

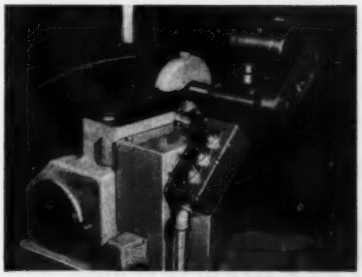
Adv.



VERTICALLY MOUNTED ON BRIDGEPORT MILLING MACHINE, a Dumore Tool Post Grinder provides an ideal high speed precision grinding head for use with small mounted wheels, points or carbide burrs.

MOUNTED ON UNIVERSAL GRINDER, a Dumore Tool Post Grinder finishes an internal section of a Jacobs chuck.

MOUNTED ON USED MILLER BASES, Dumore Tool Post Grinders provide a Chicago manufacturer with dependable high production, precision grinding equipment at an astonishingly low cost.



SPECIAL CUT-OFF MACHINE automatically sizes piston ring springs. Machine was easily made at low cost with a Dumore Tool Post Grinder to carry the cut-off wheel.

are you making the most of your lathes, grinders, millers, planers, shapers?

DUMORE
TOOL POST GRINDERS

Provide precision grinding equipment on any basic machine

Whenever precision of fit or finish is essential, and tooling cost is a vital factor, portable Dumore Tool Post Grinders will provide the complete answer. Lathes can be turned into external or internal cylindrical grinders. Planers, millers, and shapers can become surface grinders. Special grinding and cut-off machines can be built at amazingly low cost!

Simplified mounting is the secret of quick change-over—it also speeds re-converting to original set-up. Dumore Tool Post Grinders are continuous duty rated for high production. They consistently deliver precision to .0001" tolerances with surface finishes of 6 to 8 micro-inches. There's a complete line of nine models, ¼ to 3 hp, for every size of basic machine and type of grinding job.

Catalog 55 FL gives complete details, write for your copy.

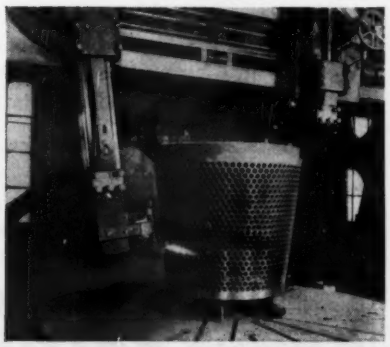
SOLD BY LEADING DISTRIBUTORS EVERYWHERE . . .

You can do more grinding with Dumore Grinders on any machine tool!

DUMORE
PRECISION TOOLS

1304 Seventeenth Street • Racine, Wisconsin

AUTOMATIC DRILL UNITS
TOOL POST and HAND GRINDERS
MICRO-DRILLS



MOUNTED ON RAM OF A BORING MILL, a Dumore Tool Post Grinder solves the tricky problem of grinding a high finish on perforated, tapered, cast-iron strainer cores.

CIRCLE INFORM-A-GRAM KEY NO. 47

*TORQUE WATCH GAUGES

NEW
easy-to-read dials have directional color coding... recessed unbreakable crystals
NEW
special-design ¼" capacity keyless chucks can be hand applied to shafts only ⅛" long. Keyed chucks available on special order
NEW
fist-sized gripping areas are color coded to identify range

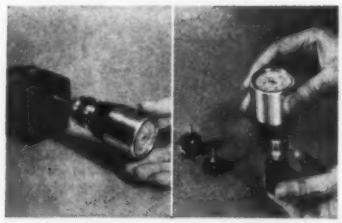
by *Waters*

NOW.....YOU CAN ACCURATELY HAND-GAUGE ALL STARTING AND MOVING TORQUES BETWEEN 0.005 AND 40 OUNCE INCHES!

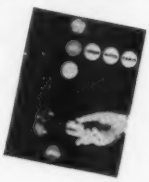
New, improved Waters Torque Watch Gauges put torque measurements on a production line basis. Costly, time-wasting laboratory "lash-ups" are eliminated.

Simple one-hand operation and easy-to-read dials speed accurate readings. Standard accuracy is ±5% of full scale. Accuracy of ±2% of full scale is available on special order. Any standard one-way 5% gauge may be calibrated to ±1% accuracy at a single point only.

Complete line includes clockwise, counterclockwise and bi-directional models . . . with dials reading in ounce inches or gram centimeters. Special chucks and adapters extend range of application.



SEND FOR BULLETIN AND PRICES on the 38 available models.

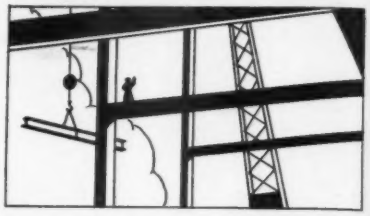


*DESIGN PATENT 177889

Waters **Waters MANUFACTURING, INC.**
BOSTON POST ROAD, WAYLAND, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 48

GROWING PAINS



A building with 25,000 sq ft of floor space will be erected for the manufacturing and repair division of the **Westinghouse Electric Corp.** The structure, scheduled for completion in October, will have a high bay section 50' wide and 200' long, equipped with a 50-ton crane. The plant will manufacture cores and coils used for the repair of distribution transformers. It will also be equipped to perform heavy repair work on industrial and utility equipment.

◆

LeCount Tool Works, Inc. recently moved into its new building, offering improved manufacturing facilities and methods for faster service and higher mandrel quality.

◆

The new 63,000 sq ft manufacturing plant of **Hoover Tool & Die Co.** is now in use. Facilities include 4,500 sq ft of space for the engineering department and 5,000 sq ft for office space.

◆

A building program was completed by **Mohawk Tools, Inc.** when their recently expanded plant began production. The expansion houses manufacturing facilities for the fabrication of Size-Optional and special Subland tools.

◆

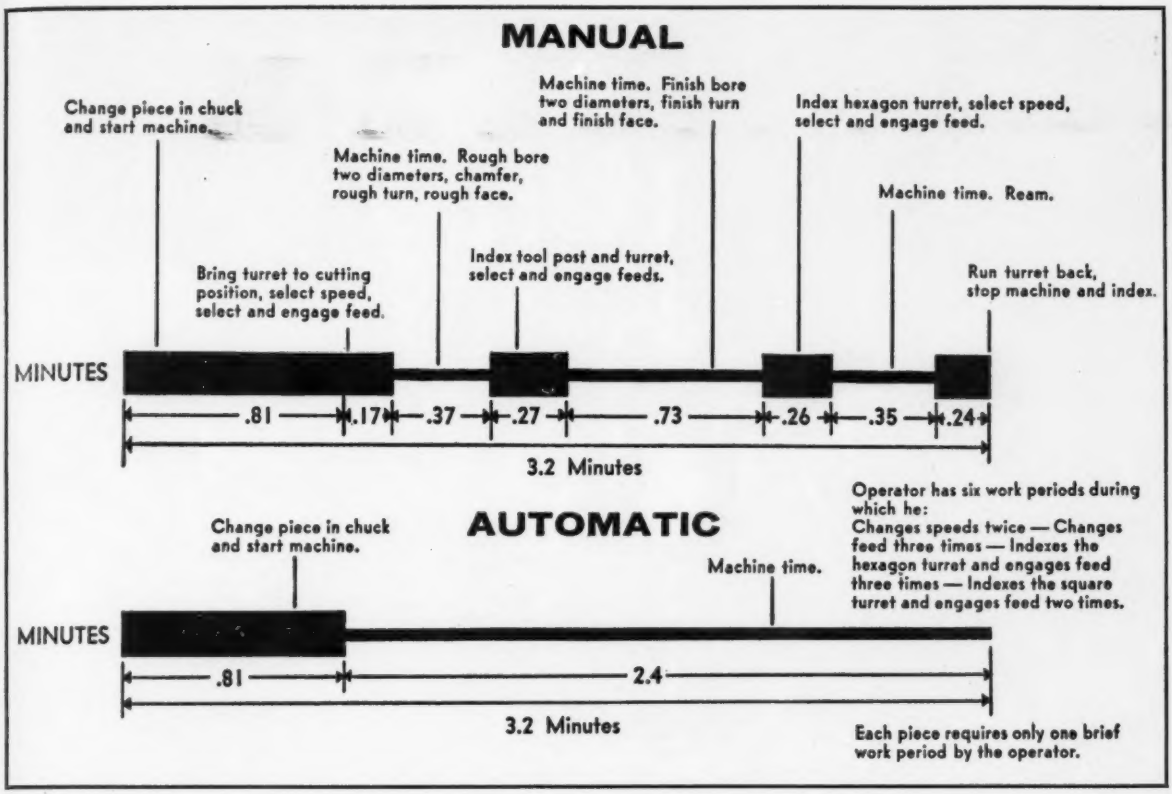
Over 75,000 sq ft of floor space has been added to its Watertown, Mass., production facilities by **Lewis-Shepard Products, Inc.** The new production area is being used for the mass assembly of fork lifts, high-lift walkie-type trucks, and hand- and electro-hydraulic stacking equipment.

◆

Compacted Metals Corp. recently moved into a new plant in Waukegan, Ill. The new building will enable the company to consolidate its entire operation under one roof, for greater efficiency. New manufacturing equipment, a new laboratory, and engineering facilities are provided.

◆

Production capacity increases up to 500% are now possible at the new plant of **Rocheleau Tool & Die Co., Inc.** It is fully equipped to handle many types of jobs such as production of precision machine parts, dies for metal stamping, special machines, jigs, and fixtures.


MANUAL
Change piece in chuck and start machine.
Bring turret to cutting position, select speed, select and engage feed.
Machine time. Rough bore two diameters, chamfer, rough turn, rough face.
Index tool post and turret, select and engage feeds.
Machine time. Finish bore two diameters, finish turn and finish face.
Index hexagon turret, select speed, select and engage feed.
Machine time. Ream.
Run turret back, stop machine and index.
MINUTES
.81
.17
.37
.27
.73
.26
.35
.24
3.2 Minutes
AUTOMATIC
Change piece in chuck and start machine.
Machine time.
Operator has six work periods during which he:
Changes speeds twice — Changes feed three times — Indexes the hexagon turret and engages feed three times — Indexes the square turret and engages feed two times.
MINUTES
.81
2.4
3.2 Minutes
Each piece requires only one brief work period by the operator.

How the new Gisholt Fastermatic makes you

MORE MONEY DURING MACHINING TIME

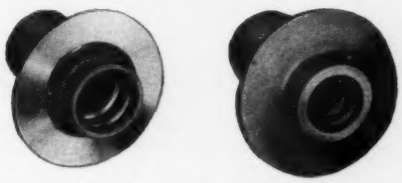
Drastic reduction of operator time in machine handling —that's the story behind the success of the new Gisholt Fastermatic Automatic Turret Lathe.

Evidence? Look at the chart above. *Compare* the time and work cycle of a manually operated turret lathe with a Gisholt Fastermatic—*on the same job.*

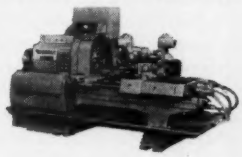
The piece, a wheel hub, is rough-bored, finish-bored, reamed, rough-faced, finish-faced and chamfered. Both cross slides and three hexagon turret faces of the Fastermatic are used. Identical tooling on the other three hexagon turret faces permits finishing two parts with each complete index of the turret.

The contrast is startling. The manually operated machine takes over 54% of the operator's time...the Fastermatic takes only 25%! The operator's "free time" is doubled—giving him ample time to keep another Fastermatic under cut on a similar operation *and also* inspect and stack finished parts or perform other work.

You may have jobs where the new Fastermatic can show even greater savings. Let Gisholt help you find out —mail the coupon now.



A COMPLETELY NEW MACHINE. New selector-switch control panel on Gisholt Fastermatic reduces setup time 50% or more. Operator simply chucks piece, starts automatic cycle, removes completed part. Human error is eliminated. Operator is free during machine cycle to handle additional units or to do other work. New Fastermatic is quick and easy to set up; no cams to change. Ideally suited for long- or short-run operations. Increased power, higher spindle speeds permit more efficient use of today's cutting tools. *Investigate now.*



GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

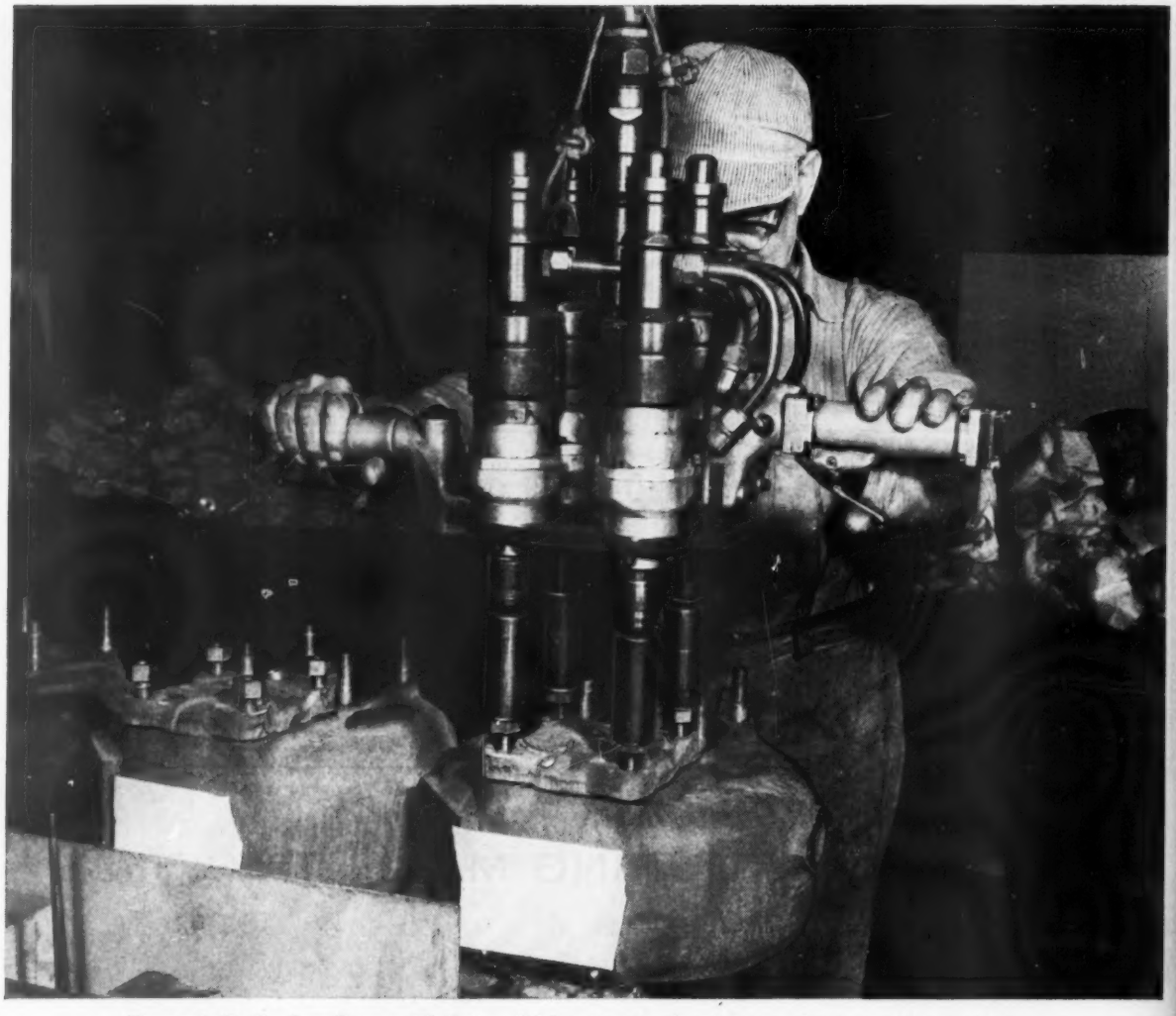
ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

Gisholt Machine Company
1202 E. Washington Ave.
Madison 10, Wisconsin

☐ Send new Fastermatic Catalog 1179-A.
☐ Have Gisholt Representative call.

Name.....*Title*.....
Company.....
Street Address.....
City.....*State*.....

CIRCLE INFORM-A-GRAM KEY NO. 49



Four-spindle Gardner-Denver (Keller) multiple nut setter drawing up valve cover nuts on air compressor cylinder head—assures accurate torque control even on short production runs such as this.

Fast, accurate nut setting for any type production setup

Keep high-production pace

Increase the pace of your high-volume assembly lines with Keller multiple nut setters. They're fast—yet always accurate. You simply set them to the exact torque required . . . put them to work . . . forget them.

Made of standardized components, these versatile nut setters pay off in a hurry. They save time . . . are highly adaptable to a wide variety of jobs.

Speed low-production runs

For relatively low-production jobs such as the one pictured above, Keller multiple nut setters also cut time and costs. You run many nuts at once . . . assemble units faster. You eliminate manual torque wrench checks with accurate torque control . . . cut labor costs.

Standardized components make switching from job to job quick and easy. When the bolt pattern changes, simply move the standard spindles and handles to a new job-tailored mounting plate.

Very likely there are money-saving applications for Gardner-Denver's Keller multiple nut setters in your plant. Contact your Gardner-Denver representative for complete details.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 50

ANOTHER CUSHMAN
AIR CHUCK
AT WORK!
see our new products
booth 1439
'58
ASTE EXPOSITION
CUSHMAN CHUCKS,
a product of American quality,
labor and materials.
Sold through
your industrial
distributor.
THE CUSHMAN CHUCK COMPANY
hartford 2, conn.

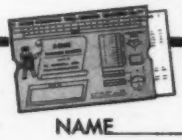
ACME

QUALITY... PRECISION... *and Fast Delivery!*

ACME
INDUSTRIAL CO.
206-222 North Laflin Street
Chicago 7, Illinois

Wild claims? Never! Not with Acme supplying each for over 35 years. If you want the very best, and we are sure you do, always buy your drill jig bushings from Acme through our many distributors.

Acme's concerted effort to supply your needs has built a strong national distribution system. All standard bushings and dowel pins are stocked by your local distributor. Try his service. We believe it's unbeatable.



SEND ME YOUR FREE DRILL BUSHING SELECTOR —204

NAME_____

FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 52

6000 WAYS TO CUT YOUR FILING COSTS...

We make 6000 types of files. There's one that's exactly right for your filing operation. Using it will reduce your costs by cutting the amount of filing time. And time, not the file, represents the largest part of filing costs.

Just as the right Nicholson-made file means *faster* results, it also means *better* results. Closer adherence to strict filing standards further reduces the cost of your filing operation.

We take infinite care to produce the highest quality files available. *You'll find a complete selection, under the trademark Nicholson or Black Diamond, at your Industrial Distributor's.*

Next time you order files, specify Nicholson, Black Diamond or X.F. (*Extra Fine*) brand in Swiss Pattern. And ask your distributor about recent Nicholson File Company developments such as the "Magicut" All-Purpose Machinist's file. He'll tell you how to use them for best results.

* **Industrial Distributors provide the finest goods and services in the least possible time. Our files are sold exclusively through them.**

NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON and BLACK DIAMOND FILES

A FILE FOR EVERY PURPOSE

New!

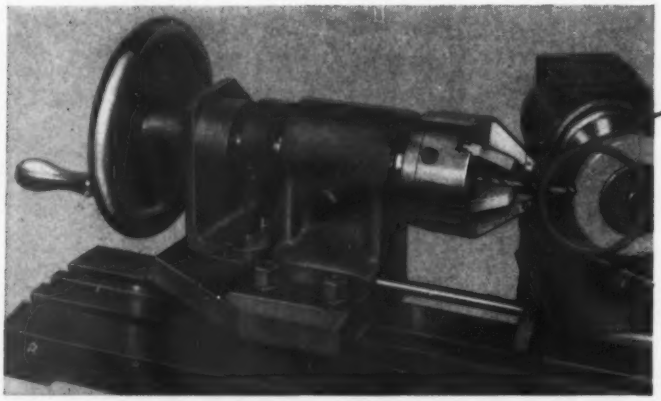
TRU-KUT POINT MASTER

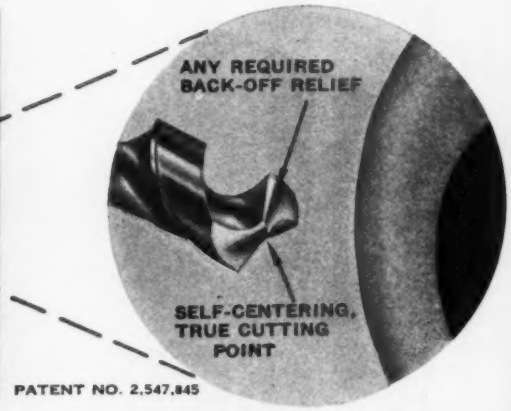
Produces and Reproduces "TRU-KUT" Points on Drills

EASIER . . .
FASTER . . .
LOWER COST . . .
CONSISTENT CUTTING POINTS

In many plants, the cost of producing drilled holes is one of the highest manufacturing expenses. Yet, over the years the inefficient chisel edge drill point with its large negative rake angle has remained virtually unchanged.

To secure more efficient cutting action at the drill point, tool room and production personnel frequently regrind chisel point drills by hand. But, hand grinding is costly, time consuming and results are seldom consistent.





PATENT NO. 2,547,845

NOW! Detroit Reamer & Tool Company offers the simple to use Tru-Kut Point Master—it is comparatively low in cost and eliminates the human variance factor. After quick and easy set-up, Tru-Kut drill points having any required cutting or relief angle can be duplicated time after time on the Point Master—and at a much faster rate of production.

The Tru-Kut Point Master can be used on most cutter grinders, Universal grinders and surface grinders. Standard grinding wheels are used. The front edge of wheel periphery is dressed to a radius that provides the self-centering "Tru-Kut" point.

Types of drills you can resharpen with the Tru-Kut Point Master for more efficient drilling are almost unlimited—crankshaft drills, sheet-metal drills, standard drills, step drills, etc. You can also grind lead angles and chamfers with radial clearance on taps; chamfers, end cuts and chip-breakers on 2-flute and 4-flute tools; chamfers and points on step-drills; thin-out webs at front; and gash cutting edges.

For additional design features, benefits, grinding, uses, etc., write to:

Tru-Kut Drill Points Assure:

- Rounder Holes
- Straighter Holes
- Truer sized Holes
- Practically burr-free Holes
- Less Bell-mouthing
- Self-centering drills
- More accurate positioning
- Longer drill life
- Cooler cutting drills
- Cutting edges from O.D. to center of drill point.
- Less grabbing when drilling thin metal
- Minimum work distortion when drilling thin metal
- Proper clearance on entire cutting edge of point
- Lower drill thrust
- Fewer guide bushings, jigs, fixtures, etc.

D R & T COMPANY

DETROIT REAMER & TOOL COMPANY

780 W. MAPLE ROAD • P.O. BOX 174 • BIRMINGHAM, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 54

Talking About Die Sets

with

Phil Marsilius

Executive Vice-President
The Producto Machine Co.

How to Select and Order a Catalog Die Set—Do you always order the die set you *really* need for the job...or do you overlook a specification which results in your having to "make do" with the set you ordered or lose time by having to re-order?

Once again, we feel that a simple and basic practice should be emphasized because our daily experiences show that even the most painstaking individual occasionally overlooks one or more factors in preparing to place an order.

Here is our suggested check-list for selecting and ordering a catalog die set:

1. Lay out the die. Allow sufficient area for feeding devices and auxiliary stock guides that may be required. Determine also what areas must be left clear for part ejection or scrap.

2. Determine type of set you need—rear two-pin, four-pin, center-pin, etc.—according to tolerances and construction of die.

3. Place layout on templates for the type of die set you have chosen. Select die area that best meets the limits established in Step 1.

4. Select material for die set—semi-steel, all-steel or combination—based on the die's strength requirements.

5. Select thicknesses of punch and die holder in line with strength requirements and allowable press shut height.

6. Determine length of guide-pin required*, based on length of stroke or ram clearance.

7. Determine type and length of bushing and material from which it should be made, based on accuracy, speed of operation and required life expectancy of die.

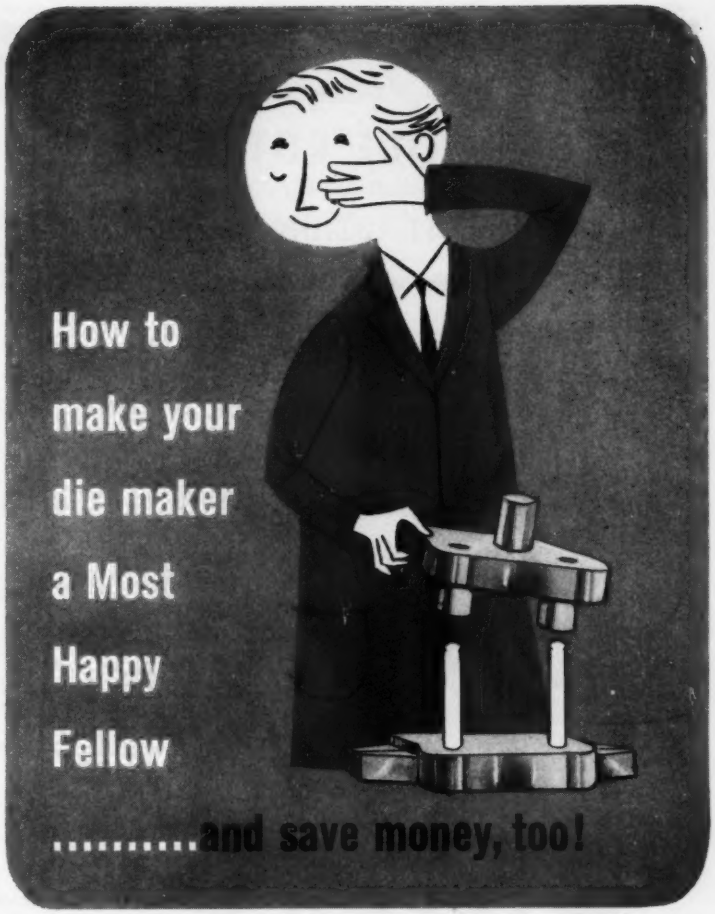
8. Select shank diameter for the press on which die will be run.

9. Choose grade of precision required—Master or Commercial—based on tolerances and number of pieces to be produced.

10. Order die set which meets most closely the above requirements, making certain that *all* ordering information is included: Catalog number and quantity; Master (Precision) or Commercial grade; length of guide pin; type of bushing; diameter of shank or "no shank"; how to ship. Keep in mind that special thicknesses of punch holder and die holder can also be ordered if required.

Of course, you may not find it possible to check these points in the exact sequence presented. However, if you will make it a habit to use this check-list for each die set you need, you can avoid making costly errors in ordering.

*"L" dimensions pertaining to pin length as shown in die set catalogs refer to distance from bottom of die holder to top of pins. They do not necessarily apply to actual guide pin lengths. Adv.



It's easy. Just be sure to specify Producto die sets with *Qwik-Fit guide pins.*

Then your die maker will always be able to assemble and disassemble his die sets practically blindfolded! No longer will he have to line up pins and bushings cautiously...tediously hammer die sets together...or pry them apart. With Qwik-Fit guide pins, the die set almost *puts itself together.* The spherical-angular radius on these pins prevents jamming or cocking *regardless of how the punch holder is started on.*

Think of the time your die maker will save...and the money *you* will save. Dies are growing more complex daily and that means assembly and disassembly of the die set dozens of times. In plants all over the country, Producto's Qwik-Fit pins are saving up to 75% of the time formerly required for these operations.

To improve morale and increase productivity, join the growing ranks of die manufacturers and users who specify "Producto die sets with Qwik-Fit guide pins." They are available on Master die sets at no extra cost.

TAKE THE QWIK-FIT TEST YOURSELF AT THE TOOL SHOW—VISIT PRODUCTO BOOTH 1500 '58

THE PRODUCTO MACHINE COMPANY
970 Housatonic Avenue, Bridgeport 1, Connecticut

Wherever die sets are used

PRODUCTO

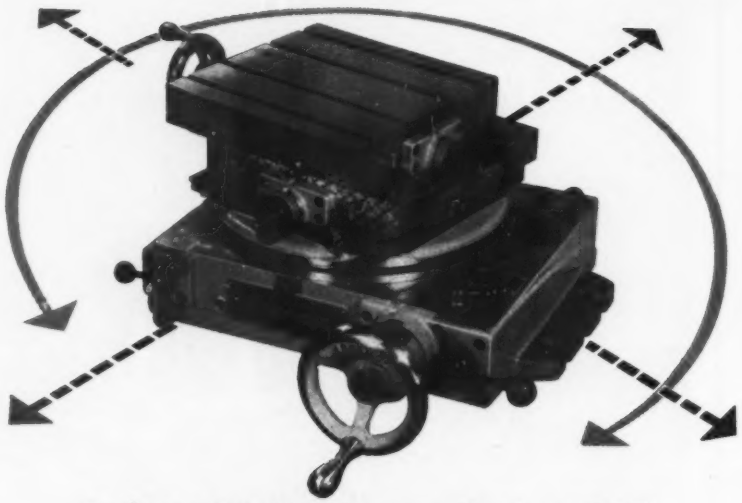
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

Advance

CROSS-SLIDE ROTARY TABLE

for Vertical Milling Operations

HAS "COST-CUTTING" EFFICIENCY



Reduces Set-Up Time as Much as 90%

The Advance Cross-Slide Rotary Table permits fast, precise positioning of work-pieces from *one set-up*. Eliminated is the series of error-inducing multiple set-ups as done on conventional rotary tables.

SAVES TIME ON RADII AND ANGLE MILLING
DESIGNED BY TOOL AND DIE MAKERS

16 hrs. with Advance/38 hrs. without special equipment. This is an unusual job where the length of cut required one-half the length of the tool steel work-piece to be milled to shape, after which the work-piece was turned over and completed. The two cuts matched each other within the maximum permissible tolerance of .002

193 hrs. with Advance/285 hrs. without special equipment. 12 x 13 x 4½" thick tool steel die insert shown in the "roughed-out" stage. Hogging cuts can be taken to the capacity of the milling machine head without damage to the Advance Cross-Slide Rotary Table.

ADVANCE *MILLING MACHINE T-SQUARE*
SAVES TIME ... IMPROVES PRODUCTION

The Advance T-Square eliminates the need for placing small work-pieces in clamps or vises which previously have been "squared-up" or "indicated". This T-Square handles both large and small work-pieces with complete ease. It is unaffected by pressure or vibration.

SEE US AT THE
A.S.T.E. TOOL SHOW
Philadelphia
MAY 1-8 — BOOTH 2111

Call or Write For Complete Information

ADVANCE PRODUCTS CORPORATION

NORTH SHORE DRIVE

BENTON HARBOR, MICHIGAN • WAlnut 5-8809

CIRCLE INFORM-A-GRAM KEY NO. 56

Presenting . . .
Representing . . .

New territorial representatives for Eldorado Tool and Mfg. Corp. are Nelson R. Church Co. of Pawtucket, R. I., covering Massachusetts, Maine, Vermont, New Hampshire, and Rhode Island; Benson and Church Co. of Palisades Park, N. J., southern New York State and Northern New Jersey; Horace S. White Co. of Cincinnati, southern Ohio and Kentucky; Rite-Way Tool Co. of Pittsburgh, western Pennsylvania; and E. M. Benson Co. of Meriden, Conn., Connecticut.

Adamas Carbide Corp. has announced the appointment of Ellis Machinery and Supply Co. of Tampa, Fla.; M. B. Industrial Supply Co. of Santa Ana, Calif.; and De Jo Tool and Supply Co. of Santa Barbara, Calif., as representatives. The Bauer Co. of Ft. Worth, Texas, will serve northern Texas and Oklahoma.

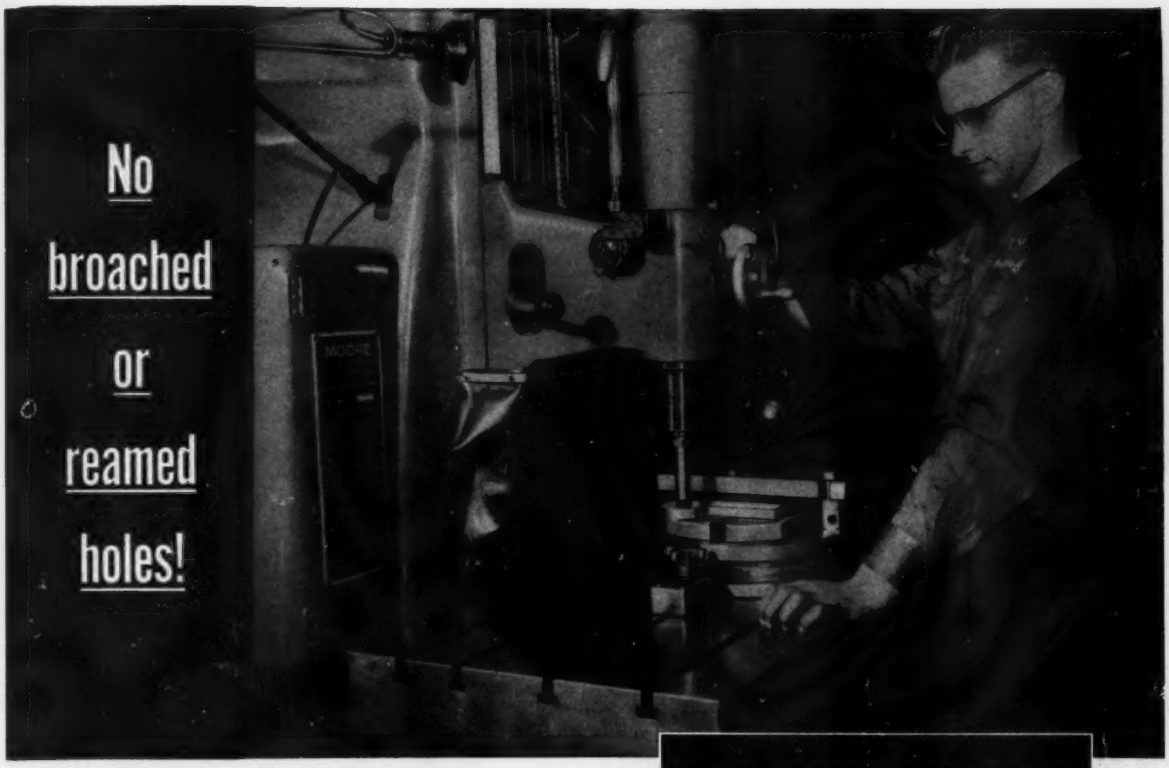
Addy and Goetz Machinery Co. of Cleveland has been named distributor for presses made by Hamilton Division of Baldwin-Lima-Hamilton Corp.

New distributor in Montebello, Calif., for tool bits and related products for Latrobe Steel Co., is Machinist's Tool & Supply Co.

W. H. Lutz Co., Wheaton, Ill.; Production Tools of Indiana, Indianapolis; Industrial Sales & Service, Inc., South Bend, Ind.; and Lauderdale Tools, Ft. Lauderdale, Fla.; are representing Benco Collet Mfg. Co. of Cleveland. Others are Walter H. Brooke Machine Tools, Chicago; Metal-Tools Co., Hopkins, Minn.; Peter Flesch, Garden City, N. Y.; Cascade Tool Sales, Portland, Ore.; Apex Machine Tool Co., Charlotte, N. C.; and K. H. Carr, Ft. Worth, Texas.

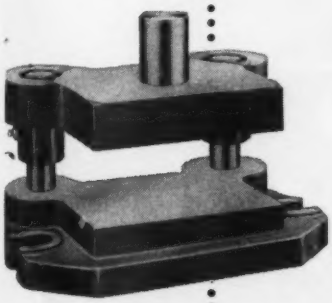
Wetzel Tool Sales Co. has been appointed stocking distributor for Detroit Tap & Tool Co., in Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island.

E. V. Nielsen, Inc. announces the appointment of Maurice W. Acre of Los Angeles as manufacturer's representative for the entire line of specialty tools. His territory includes California, Oregon, Washington, Idaho, Utah, Montana, Wyoming, Colorado, Arizona, Nevada, and New Mexico.



DANNEMAN PRECISION DIE SETS

They're precision bored on master plates to give you absolute interchangeability between any die shoe or punch holder



Danneman die sets are precision built every step of the way to assure long, trouble-free production accuracy. You can be sure of perfect alignment because we finish Thompson-grind all four horizontal sides . . . assemble with cylinder square fixtures to insure squareness of leader pins and bushings. Even the U-lugs are machined for additional clamping accuracy.

Bushings and leader pins with lubricating devices are Lamina precision hardened and ground — or if you prefer a low cost die set, we can supply regular plain hardened and ground steel bushings with lubricating grooves on the guide posts.

Specify *Danneman* precision die sets on your next job and *see* the difference. Catalog on request.

DANNEMAN
DIE SET DIVISION

ACME-DANNEMAN CO., INC.
Sales Offices: 45 West 18th St., New York 11, N. Y.
ALgonquin 5-7150 *Works:* 203 Lafayette St., New York 11, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 57

How DoALL's "Continuous SERVICE" insures profitable operation with DoAll Machine Tools

7-point program of interest to all plant executives

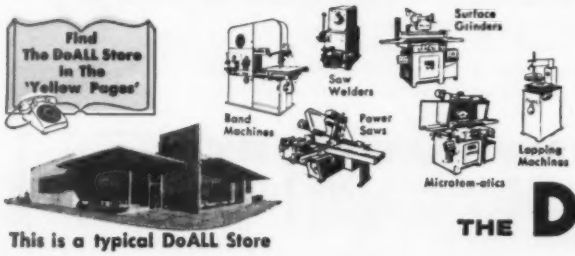
To keep your DoALL machines producing at the highest possible profit, The DoALL Company offers a 7-point User-Help Program—far beyond any other service in the industry.

1. **FREE INSTALLATION SERVICE** to assure correct setup and full protection during initial operation.
2. **FREE OPERATOR TRAINING** certifies every operator you assign. In addition to personal instruction, special help includes "tip-sheets," wall charts and handbooks on latest techniques.
3. **FREE MACHINING ANALYSIS** is our specialty to keep your DoALL machines at full efficiency as new materials, new jobs and special requirements develop in your production.
4. **FREE MACHINE FIXTURING** helps to obtain peak performance in production of duplicate parts. Service includes sketches, recommending fixtures proved on similar jobs. Saves your time and money . . . prevents costly, needless experiments.
5. **FREE JOB-SPOTTING** within your plant keeps your DoALL machines busy. We can evaluate many jobs you may have overlooked—jobs your DoALL machines can do at lower cost.
6. **FREE MACHINE INSPECTION** — periodic inspection includes minor adjustments and reporting signs of wear—with timely tips to correct these conditions. Written Certificate of Inspection is furnished.
7. **DoALL PACKAGE SERVICE** provides a uniform, high-quality service at lowest possible costs from basic overhaul to production maintenance and modernization. Safeguards your DoALL machine investment . . . assures continuous profitable returns.

These exclusive services are administered by over 200 factory-trained engineers, one of whom is located *near* your plant.

CALL TODAY FOR FREE MACHINE CHECKUP

Ask your nearby DoALL store to give your DoALL machines a complete inspection and operation test—free of charge!

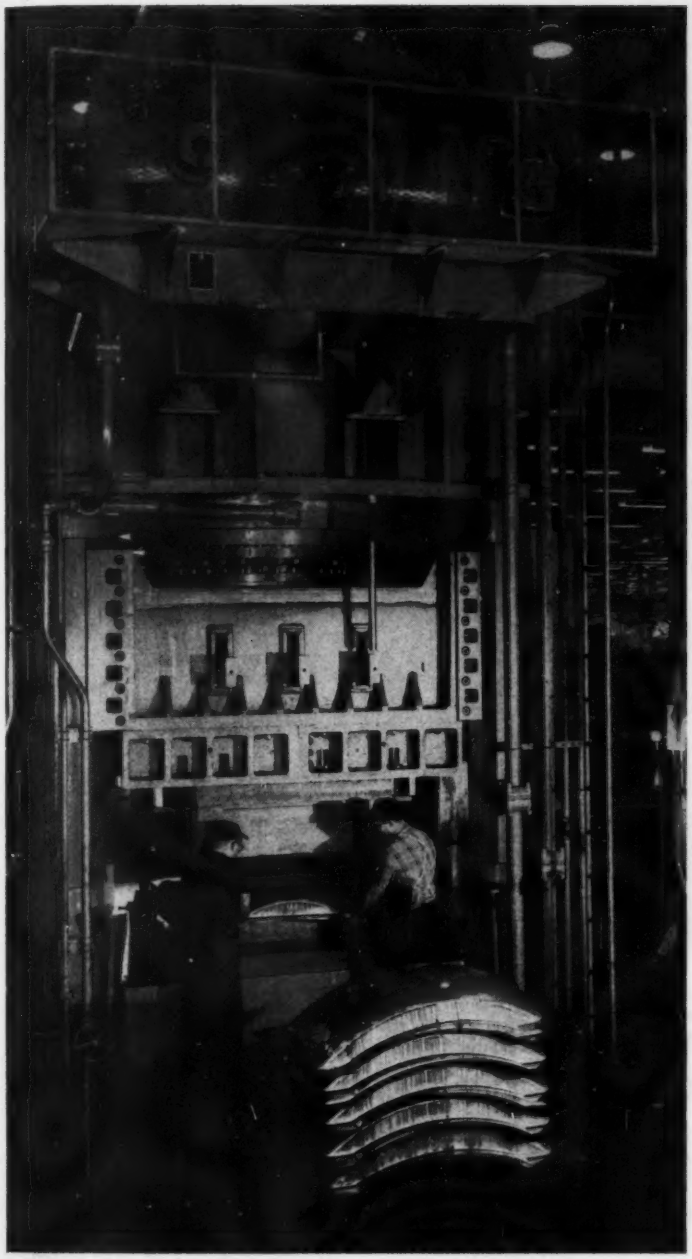


This is a typical DoALL Store

THE DoALL COMPANY, Des Plaines, Illinois

S-1

CIRCLE INFORM-A-GRAM KEY NO. 58



HPM

3000 TON PUSH-BUTTON POWER PACKAGE AT CATERPILLAR TRACTOR CO.

Heavy gauge fenders for wheel type tractors are just one of many parts formed on this 3000 ton H-P-M press at Caterpillar Tractor Company, Decatur, Illinois. In this, the world's largest motor grader and wheel type tractor plant, dependable H-P-Ms are a vital part of two modern production lines. This 3000 ton H-P-M is typical. H-P-Ms with infinite control of clamping and forming pressure offer adjustable ram speed, Fastraverse® approach and ram return. All controls are at the operator's fingertips. Quick set-up and interchange of dies, are assured. A complete line of heavy-duty presses from 5 to 25,000 ton capacity makes H-P-M a prime consideration for your production planning. See your H-P-M field engineer at the planning stage or write the factory in Mount Gilead.

H-P-M is Growing—Now More Than Ever Before, Dependable H-P-Ms Are Available For All Your Metalworking Needs.

- **Presses for Drawing, Forming, Coining, Forging, Briquetting, Straightening, Extruding**
- **Henry & Wright Dieing Machines**
- **Die Casting Machines**
- **Hydraulic Pumps, Valves, Cylinders, Power Units**

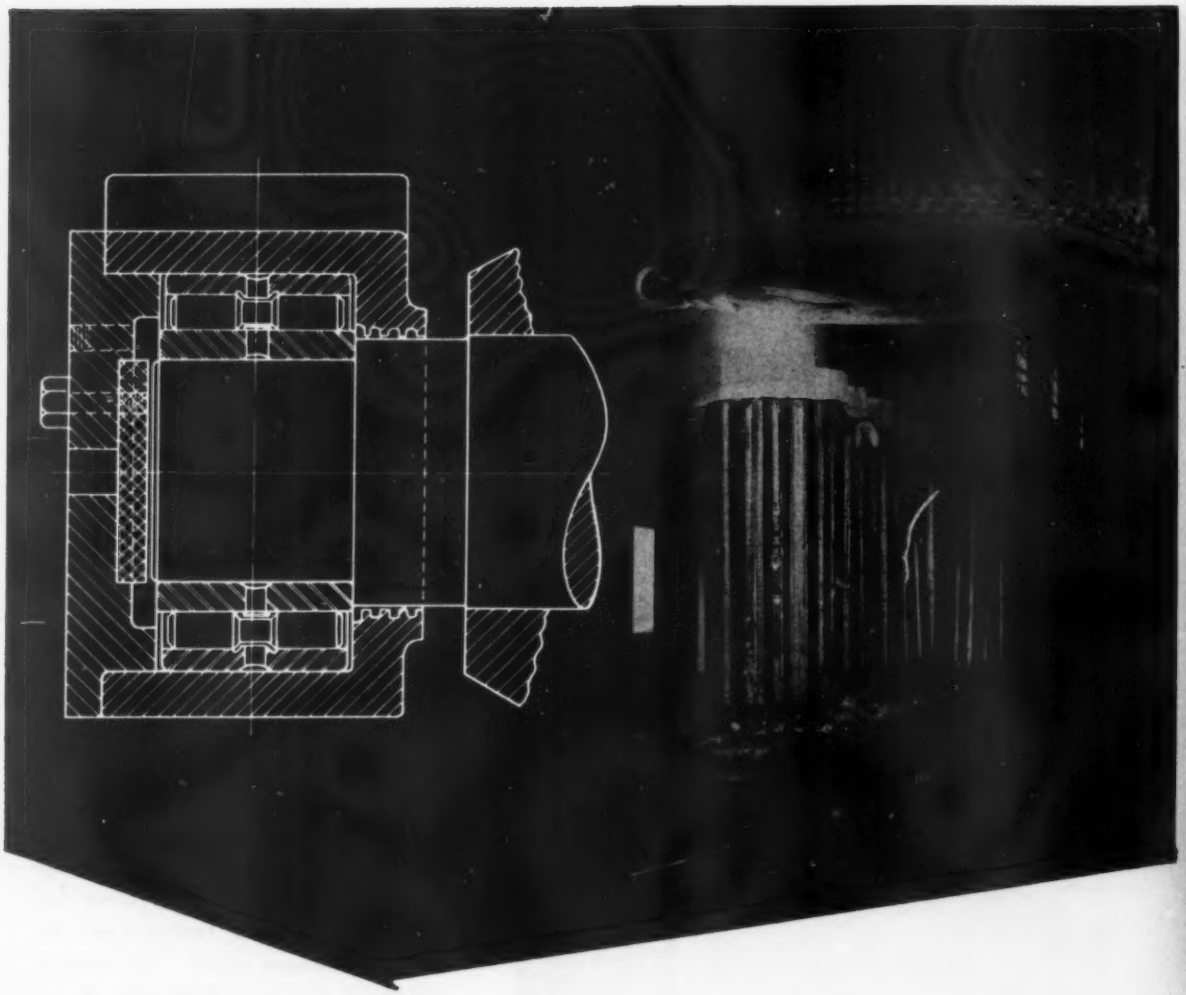
H80S

THE HYDRAULIC PRESS MFG. COMPANY

A DIVISION OF KOEHRING COMPANY • MOUNT GILEAD, OHIO, U. S. A.

HPM

CIRCLE INFORM-A-GRAM KEY NO. 59



Bearings, Inc. engineering service . . . solves another bearing problem

Ingot mold cars for a large tube mill were continually out of service due to the short life of babbitt, bronze or other bearings originally supplied in the cars.

The Trouble? Bearings, Inc. engineers found shock loads far beyond the capacities of the original bearings. Extreme wear on bearings due to excessive skewing, bent axles and uneven track.

The Answer. Shown above is the Bearings, Inc. drawing of the installation that replaced the original bearings. It has greatly increased load capacity and no dimensional change is required in the shaft or bearing housing.

The Result. The new bearing is designed on a new principle that keeps rollers in line and eliminates skewing. Shock loads due to uneven tracks have little effect on our installation for its construction makes possible a greater number of rollers available to support the load at all times.

This is just one of the many such problems we have solved for our customers. In all cases we supply only bearings we are authorized to distribute. They are new and come to you fresh in the manufacturers' boxes.

If you have a bearing problem or need replacement bearings in a hurry — call or write our branch nearest you, they're ready to give fast service.

Providing bearing service in the North ➤ **BEARINGS, INC.**

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden
NEW YORK: Buffalo, Bolanrol Corp. • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

and in the South ➤ **DIXIE BEARINGS** *INCORPORATED*

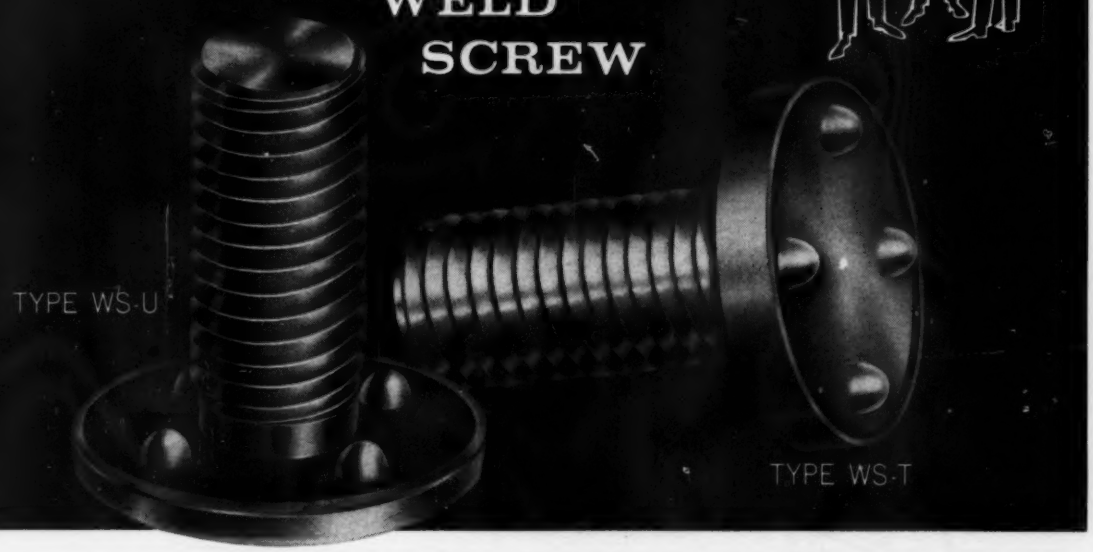
FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans
N. CAROLINA: Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville • Nashville

CIRCLE INFORM-A-GRAM KEY NO. 60

NOW . . . FOR THE FIRST TIME . . . YOU CAN GET
WELD SCREWS THROUGH YOUR INDUSTRIAL DISTRIBUTOR!

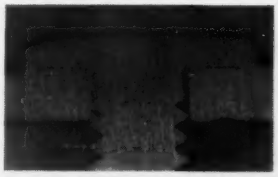
No more waiting for shipments—no need for large, in-plant inventory. Your Industrial Distributor has new, improved P-K Weld Screws. He can serve you promptly, any time and in any quantity, large or small.

for stronger, neater fastenings . . .
the new **P-K® RIMGUARD* WELD SCREW**

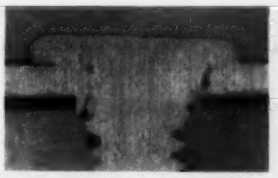


NEW . . . RIMGUARD controls and guards quality of the weld. Rim construction limits amount of pressure that may be applied during fusion—reduces amount of current required—minimizes burning or discoloration—substantially minimizes "spatter" and "flash".

NEW . . . 4-PROJECTIONS assure proper weld area necessary to develop the full strength of the fastening. P-K® Rimguard Weld Screws are available with projections on top of head (Type WS-T) or with projections under the head (Type WS-U).



RIMGUARD weld screw—Observe the complete contact of the head of the screw with the work. This is doubly important where work is to be porcelainized or enameled.



ORDINARY weld screw—Since fusion is uncontrolled, weld is not uniform. Note the possibility of corrosion due to moisture condensation in space between head and work.

Ask your P-K Distributor for samples and complete information, or write Parker-Kalon direct.

PARKER-KALON® Rimguard* weld screws

PARKER-KALON DIVISION, General American Transportation Corporation, Clifton, New Jersey

See the Rimguard Weld Screw in P-K's Booth #739—at the Design Engineering Show—Chicago—April 14-17/*Patent Pending.

TRIM Preferred

IN
ALL
DEPARTMENTS

THE MASTER CUTTING and GRINDING FLUID

1 ENGINEERING DESIGN . . . TRIM provides top machine efficiency.

2 PRODUCTION . . . TRIM increases production rates.

3 PURCHASING . . . TRIM costs less . . . TRIM lasts longer . . . reduces inventory.

4 SALES . . . TRIM reduces production costs . . . keeps you in competition.

5 MACHINE OPERATOR . . . TRIM always has a clean pleasant odor, NO STINK.

FROM ALL ASPECTS . . . *SPECIFY*

TRIM CUTTING and GRINDING FLUID
FOR SMOOTHER . . . EVER GREATER PRODUCTIVITY

MASTER CHEMICAL CORPORATION
13 HURON STREET • TOLEDO, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 62

— SAVE THIS AD FOR FUTURE REQUIREMENTS — DEALERS INQUIRIES INVITED —

NEW SIZES ADDED DAILY . . . IF NOT LISTED HEREIN — INQUIRE

WHY WAIT FOR SPECIAL

High Speed Steel Taps and Dies and Thread Plug Gages?

In Stock For Immediate Delivery

RIGHT HAND TAPS, DIES AND THREAD PLUG GAGES

Size	Threads Per Inch
80	80-86
0	56-64-72
1	56
2	48-72
3	40-48-64
4	32-42-44-56-60-64-72-90
5	30-32-36-40-56-60-80
6	30-36-38-42-44-48-56-60-64
7	28-30-32-34-36-38-40
8	24-26-30-38-40-44-48-56-60-64-80
9	24-28-30-32-40
10	18-20-22-26-28-30-36-40-48-56-64
11	20-22-24-28-30
12	20-22-26-27-30-32-36-38-40-48-56
13	20-22-24-32
14	16-18-26-28-30-32
15	18-20-24-32
16	16-18-20-22-24-36
17	16-20
18	16-18-20-24
19	18-20
20	16-18-20-24-32
22	16
24	14-16-18-22-24
26	14-16
28	14-16
30	14-16
1/16	56-60-64-72
5/64	56-60-64-72
3/32	38-48-50-56-60-64
.107	32
7/64	36-40-42-44-48-50-56
1/8	30-32-36-40-48-56-60-80
.132	50
9/64	30-32-38-40
5/32	24-26-28-30-32-36-38-40
11/64	24-26-30-32-36-38-40
3/16	12-18-20-22-24-26-28-30-32-36-40-48-56-64-72
.198	24
13/64	24-28-30-32
7/32	20-22-24-26-27-28-30-32-36-38-40
.227	24
15/64	20-24-28-32-40
1/4	16-18-22-23-24-25-26-27-30-32-36-40-48-50-56-60
17/64	18-20-27-28
.268	36
.277	40
9/32	18-20-24-26-27-28-32-36-40
19/64	18-24
.300	28
5/16	12-14-16-20-22-26-27-28-30-32-36-40-48-50-56
21/64	16-20-24
11/32	16-18-20-22-24-26-27-32-40
23/64	16-24
.365	28
3/8	12-14-18-20-22-26-27-28-30-32-36-40-48-56
25/64	16-24-27
.400	24
13/32	12-14-16-18-20-24-27-32-40
27/64	28
7/16	12-16-18-22-24-26-27-28-30-32-36-40-48-56
29/64	12-20
15/32	12-14-20-24-27-28-32-40
1/2	12-14-16-18-22-24-26-27-28-30-32-36-40-48-56
33/64	12-13-20
17/32	10-12-13-14-16-18-20-27-32-40
.550	24
9/16	13-14-16-20-24-26-27-28-30-32-36-40-48
37/64	10-12-27
19/32	12-18-20-24-32
5/8	9-10-12-13-14-16-20-24-26-27-28-30-32-36-40-56
41/64	11-18-24
21/32	10-11-18-20-24-27-32-40
11/16	20-.004
11/16	11-12-14-16-18-20-24-27-28-30-32-36-40
23/32	11-16-20-27-32-36-40
47/64	10-16
3/4	9-11-12-14-15-18-20-22-24-26-27-28-32-36-40
49/64	10-16
25/32	10-16-20-27-32-40
.800	16
13/16	8-10-12-14-16-18-20-24-27-28-32-40
.835	16
27/32	10-18-20-27-32-40
.850	14
7/8	8-10-11-12-13-16-18-20-24-26-27-28-32-36-40
.885	14
29/32	9-12-20-27-28-32
15/16	8-9-10-12-14-16-18-20-24-27-28-32-40
31/32	9-16-20-28-32
1	5-9-10-11-12-16-18-20-24-26-27-28-30-32-36-40-48
1-1/32	8-12-14
1-3/64	14
1-1/16	8-10-12-14-16-18-20-24-27-28-32
1-3/32	8-9-12-16
1-1/8	8-10-14-16-18-20-24-27-32
1-5/32	7-12-24-26-32-40
1-3/16	8-10-12-14-16-18-20-24-32
1.220	32
1-1/4	8-10-14-16-18-20-24-28-32
1-5/16	6-8-10-12-14-16-18-20-24-32-48
1-3/8	8-10-14-16-18-20-24-32
1-13/32	20
1-7/16	6-8-10-12-14-16-18-20-24-28-32
1-1/2	7-8-10-13-14-16-18-20-24-28-32
1-17/32	7-18
1-9/16	12-14-16-18-20-24-32
1-5/8	5½-8-10-11½-12-13-14-16-18-20-24-28-32-40
1-11/16	10-12-14-16-18-20-24-32
1-23/32	5
1-3/4	5-8-10-12-13-14-16-18-20-24-28-32-40
1.767	18
1.7715	12
1-13/16	8-10-12-14-16-18-20-24-32
1-7/8	5-8-10-12-14-16-18-20-24-32
1-29/32	18-32
1-15/16	8-10-12-14-16-18-20-24-32
2	4½-5-8-10-12-14-16-18-20-24-32
2-1/16	12-14-16-18-20-24-32
2-1/8	4½-8-10-12-14-16-18-20
2-3/16	12-16-20
2-1/4	4½-8-10-12-14-16-18-20-24
2-5/16	12-16-18-20
2.340	18
2-3/8	4-8-10-12-14-16-18-20
2-7/16	12-16-20
2-1/2	4-6-8-10-12-14-16-18-20
2-9/16	12-16-18
2-5/8	8-10-12-14-16-20
2-11/16	12-16
2-3/4	4-8-10-12-14-16
2-7/8	8-10-12-16
2-15/16	12-16
3	3½-4-8-10-12-16-18
3-1/8	12-16
3-3/16	20
3-1/4	4-8-12-14-16-18
3-3/8	10-12
3-1/2	4-8-12-16
3-3/4	4-8-12-16
4	4-8-12
4-1/8	12
4-1/4	8

LEFT HAND TAPS, DIES AND THREAD PLUG GAGES

Size	Threads Per Inch
0	80
1	56-64-72
2	56-64
3	48-56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-32-40
12	24-28-32-40
14	20-24
5/32	36
3/16	32-40
1/4	20-23-24-25-27-28-32-40-48
.277	40
5/16	18-20-24-27-28-32-40
11/32	24
3/8	16-20-24-27-32-40
13/32	20
7/16	14-20-24-27-28-32-40
1/2	12-13-14-16-20-24-27-28-32-40
9/16	12-18-20-24-27-32-40
.622	8
5/8	10-11-12-16-18-20-24-28-32
11/16	11-12-16-18-20-24-32
.720	8
3/4	9-10-12-16-18-20-24-32
13/16	10-16-18-20
7/8	9-10-12-14-16-18-20-24-32
15/16	12-14-16-18-20-24-32
1	8-12-14-16-18-20-24-28-32
1-1/8	7-12-18-20-24-32
1-1/4	6-7-8-12-16-18-20
1-5/16	12-16-18-20
1-3/8	5-6-8-10-12-16-18-20-24
1-7/16	10-12-18
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	5½-6-8-10-12-16-18-20
1-11/16	8-10-12-16-18-20-24
1-3/4	5-8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	5-8-10-12-14-16-18-20
2	4½-8-10-12
2.215	20
2-7/32	20
2-1/4	4½-8-12
2-5/16	24
2-1/2	4-8-12
2-11/16	16
2-3/4	4
2-7/8	24
3	4-8

RIGHT HAND—UNLISTED "GUN" OR SPIRAL POINTED TAPS

Size	Threads per Inch	Size	Threads per Inch
0	80 NF		
		3/8	9 NC, 14 NF
1	56 NS	1	8 NC, 12-14 NF
2	56 NC, 64 NF		
9/16	12 NC, 18 NF	1 1/8	7 NC, 12 NF
5/8	11 NC, 18 NF	1 1/4	7 NC, 12 NF
11/16	11 NS, 16 NS	1 3/8	6 NC, 12 NF
3/4	10 NC, 16 NF	1 1/2	6 NC, 12 NF

RIGHT HAND—UNLISTED "PULLEY" OR EXTRA LENGTH TAPS

Size	Threads per Inch	Size	Threads per Inch
4	40 NC, 48 NF	3/4	24 NF
5	40 NC, 44 NF	7/16	20 NF
6	32 NC, 40 NF	1/2	20 NF
8	32 NC, 36 NF	9/16	12 NC
10	24 NC, 32 NF	9/16	18 NF
12	24 NC, 28 NF	5/8	18 NF
1/4	28 NF	3/4	16 NF
5/16	24 NF	Also Larger Sizes NC & NF	

RIGHT HAND "PIPE" TAPS

TAPER "NPT" Size	TAPER "NPT" Thread	STRAIGHT "NPS" Size	STRAIGHT "NPS" Thread	EX. LENGTHS TAPER "NPT" Size	EX. LENGTHS TAPER "NPT" Thread
1/16	27	1/16	27	1/16	27
1/8	27	1/8	27	1/8	27
2½	8	1½	11½	¼	18
3	8	2	11½	⅜	18
3½	8	2½	8	½	14
4	8	3	8	⅝	14
Also British		3½	8	¾	14
		4	8	1	11½
		Also British			

LEFT HAND 'PIPE TAPS' TAPER AND STRAIGHT

Size	Thread	Size	Thread
1/16	27	1	11½
⅛	27	1¼	11½
¼	18	1½	11½
⅜	18	2	11½
½	14	2½	8
¾	14	3	8

"OVERSIZE TAPS"

RIGHT HAND N. C. and N. F. SIZES
MACHINE SCREW No. 2 TO No. 5 PLUS .002 TO .003
MACHINE SCREW No. 6 TO No. 14 PLUS .003, .005, .010
FRACTIONAL ¼" TO 1½" PLUS .005, .005, .010 AND .015

"UNDERSIZE ALSO AVAILABLE"

"PRICES OF SPECIALS ARE GOVERNED BY QUANTITY ORDERED" PRICES QUOTED UPON REQUEST

REGULAR LISTED SIZE TAPS AND TOOLS IN STOCK FOR IMMEDIATE DELIVERY

ACME TAPS

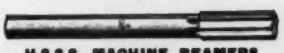
AVAILABLE FOR QUICK DELIVERY

2 WEEKS DELIVERY—When ordering or requesting quotations, kindly furnish us with the following information:

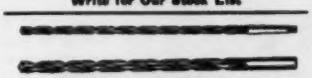
(a) Kind of material being machined.
(b) Depth of hole, through or bottom.
(c) Tap to be used horizontally or vertically.
(d) Will tap turn, or is piece expected to be turned.
(e) Is tapping job expected to be done in one pass.
(f) Would tap be backed out of hole, or machine stopped for release of tap.
(g) If possible, submit thread length, and overall length of tap desired with a blue print.

SPECIAL REAMERS

IMMEDIATE DELIVERY



H.S.S.S. MACHINE REAMERS DECIMAL, FRACTIONAL, LETTER, AND WIRE GAUGE SIZES
Prices On Application
Write for Our Stock List



SPECIAL — RIGHT HAND HIGH SPEED "EXTRA LENGTH DRILLS" In Stock for Immediate Delivery

WE ARE WELL EQUIPPED TO SUPPLY YOUR NEEDS IN ANY QUANTITY PARTICULARLY WHEN YOU ARE IN A HURRY

The Largest Stock of

Special and Standard Taps, Dies, Plug Gages

RING GAGES 2 WEEKS DELIVERY

FIELD TOOL SUPPLY CO.

Industrial Cutting Tools

31 S. DES PLAINES ST., CHICAGO 6, ILL.

All Phones: Financial 6-1195

PRECISION PRODUCTION PROBLEMS?

Here's help from Bausch & Lomb in TOOL DESIGN INSPECTION FABRICATION MEASURING TESTING

NEW! ALIGNMENT INTERFEROMETER

Accurately measures small changes in angle over a range of 30 seconds of arc (±15 seconds). Easy direct scale readings to 0.2 seconds (0.000006″).

BENCH COMPARATOR

Exclusive understage illumination—no complex set-ups, no holding fixtures for most work. Magnified silhouettes show errors instantly. Reads to 0.0001″ with optional micrometer stage.

STEREO-MICROSCOPES

Magnified 3-D views of tiny parts. Dustproof, shockproof, can be mounted right in machine or fixture. Speeds assembly, inspection. Most complete line, widest field of view.

CONTOUR MEASURING PROJECTOR

Shows magnified silhouettes or surface views. Simple operation, highest precision measurements: to 0.0001″, linear; to 1 minute of arc, angular.

OPTICAL AIDS CATALOG

Time-and-money-saving data on Surface Comparators, Industrial Magnifiers, Macroscopes, Microscope Bodies, Micrometer Discs, Wide Field Tubes, Brinell Microscopes, Shop Microscopes.

NEW TOOLMAKER'S MEASURING MICROSCOPE

Quickly measures opaque or transparent objects of any contour. Linear, accurate to 0.0001″; angular, to 1 minute of arc.

MAIL COUPON TODAY FOR VALUABLE DATA

BAUSCH & LOMB OPTICAL CO.
79828 St. Paul St., Rochester 2, N. Y.

Please send literature on optical production aids checked below:

☐ Alignment Interferometer ☐ Bench Comparator ☐ Contour Measuring Projector ☐ Toolmaker's Microscope ☐ Stereomicroscopes ☐ Optical Aids Catalog

NAME .....
TITLE .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

BAUSCH & LOMB
SINCE 1853

CIRCLE INFORM-A-GRAM KEY NO. 64

Thomas F. MacLaren has been appointed general sales manager for the Machine Tool Division of Brown & Sharpe Mfg. Co. He formerly served as director of field sales for the division.

New manager of Cutting Tool Sales in the Metallurgical Products Department of General Electric Co. is **Raymond F. Parker. Leo Yakutis** is now serving as die sales engineer in Ohio and sections of New York and Pennsylvania for Carboloy cemented carbide products; **J. R. O'Hara,** sales representative of the die sales sub-section consisting of New York, Pennsylvania, and New Jersey; and **Raymond J. Moessner,** the southern district. **Richard G. Worth** has been appointed specialist in Cutting Tool Distributor Sales.

Hydro-Line Mfg. Co. has appointed representatives to sell its complete line of air and hydraulic cylinders in western Michigan and the southeastern states. **Everett Adams** will serve in western Michigan with headquarters in Chesaning; and **J. A. Postell** will serve in Alabama, Tennessee, North and South Carolina, Georgia, and Florida, with headquarters in Atlanta.

The promotion of **Kenneth E. Joy** to general sales manager has been announced by the Judson L. Thomson Mfg. Co.

The advancement of **J. B. Hite** to service engineer for Kennametal Inc., has been announced. He was formerly supervisor of the firm's machine shop.

Frank Mohney has joined Automatic Devices, Inc. and will direct sales for both the Peeco and VFC divisions.

Edward G. Merk, formerly vice president in charge of sales, has moved into the position of national sales manager for Burgmaster Corp.

Firth Sterling Inc. announces the appointments of **Charles D. Muir** and **Norman E. Donnelly** as sales representatives for the Pittsburgh district sales office.

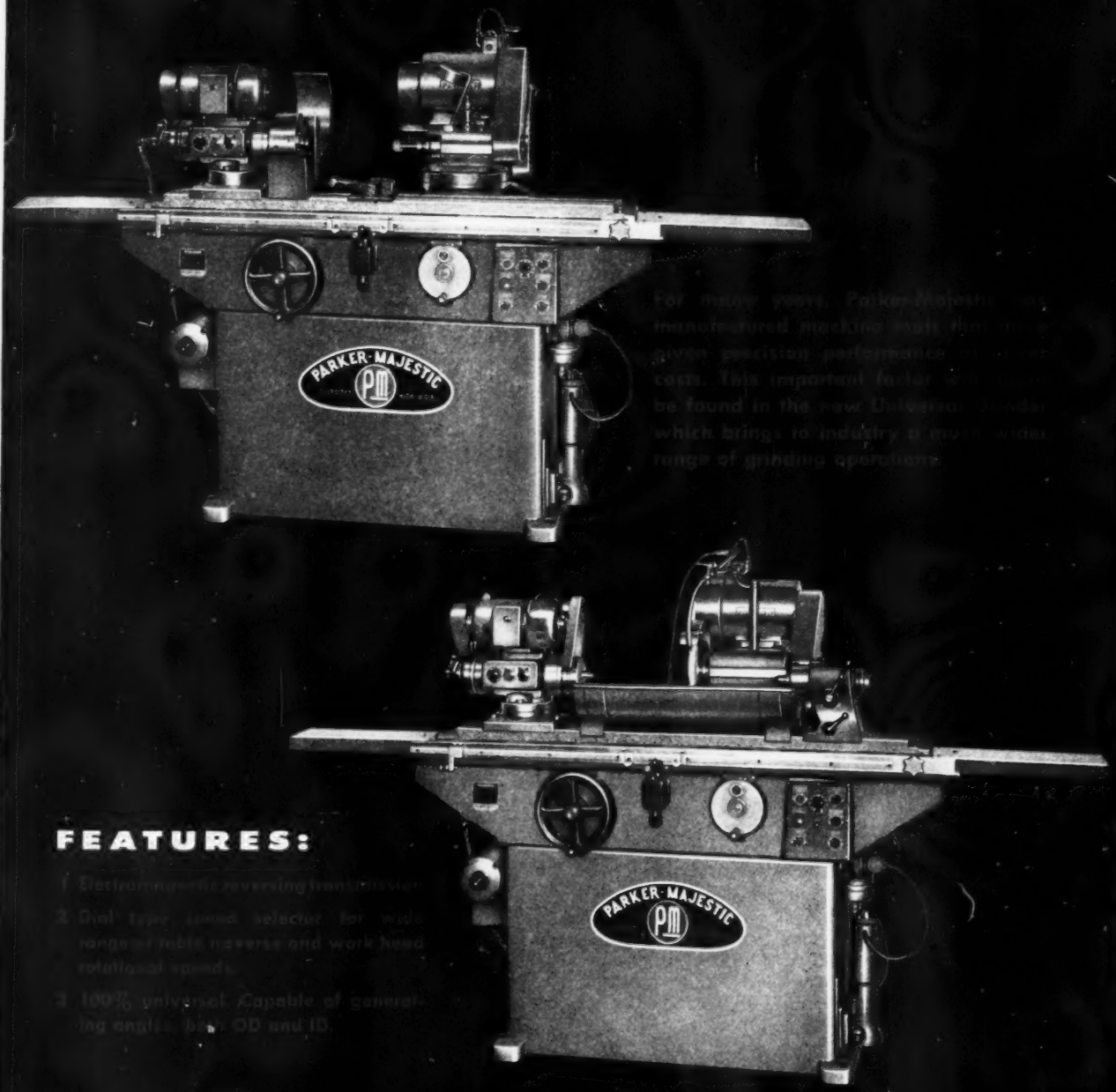
Louis J. Wiegand has been appointed assistant sales manager of Sidney Machine Tool Co.

N

• GREATER IN PERFORMANCE
• LOWER IN COST

THE NEW *Parker Majestic*

No. 2 UNIVERSAL GRINDER



For many years Parker-Majestic has manufactured machine tools that have given precision performance at low cost. This important factor can be found in the new Universal Grinder which brings to industry a machine for a range of grinding operations.

FEATURES:

1 Electromagnetic reversing transmission.

2 Dial type speed selector for wide range of table traverse and work head rotational speeds.

3 100% universal. Capable of grinding angles, bore, OD and ID.

PARKER • MAJESTIC PM PRECISION MACHINES

MANUFACTURING MEMOS

New Location and Line . . .

• Maxwell Industries, Inc. has moved from Macedonia, Ohio, to larger plant facilities at Ashtabula, to provide space for growth of added cutting tool lines. They have also acquired Kiener Cutting Tool Co., Inc., which produces carbide and high speed form tools.

Acquires Division . . .

• Sunstrand Machine Tool Co. enters the guided missile field with the purchase of American Machine & Foundry Company's Turbo Division. Turbo will be integrated with Sunstrand's aircraft component plant at Denver to form a new Sunstrand-Turbo Division.

New Division . . .

• Establishment of the Cutting Tool Division, under Thomas Hollis, Jr., as general manager, has been made known by Brown & Sharpe Mfg. Co. The division will combine the design, manufacture, and sale of both high speed steel and tungsten carbide cutting tools.

Merger Announced . . .

• The combination of Norden-Ketay Corp., designer and builder of complex electronic systems and instruments, and Solar Aircraft Co. has been revealed.

Inspection Laboratory Opened . . .

• A high precision gage testing laboratory for measuring the accuracy of gages, jigs, dies, workpieces, and fixtures has been opened by Size Control Co. This laboratory is designed and equipped to measure instruments to extreme accuracies.

Name Change . . .

• The name of Dana Corporation's Parts Division has been changed to Standard Equipment Division. This move is to further emphasize the full divisional status, and to better describe its actual function.

Agreements Revealed . . .

• A working agreement designed to lead to the commercial development of new lithium-containing metal alloys has been established by Lithium Corporation of America, Inc. and Brooks and Perkins, Inc. Both companies will participate jointly in research on alloys containing lithium and other metals.

• Temco Aircraft Corp. has entered into an agreement to acquire 80% of the stock of Fenske, Fedrick & Miller, Inc., a West Coast electronics company. Fenske, Fedrick & Miller will continue research, development, and manufacturing operations for electronic devices.

Ace Drill Bushing Co., Inc., international distributors of Ace Drill Bushings, has announced the formation of a new Michigan corporation with a similar name, and the establishment of a direct factory warehouse in Detroit. B. L. Jobe is the business manager, and sales manager is R. J. Herbert.

◆

The Siegler Corp. has acquired the Sancor Corp., manufacturer of aircraft and missile ground handling equipment, and will move this wholly-owned subsidiary from its present plant in Santa Barbara to property adjacent to Siegler's Hufford Corp. facility in El Segundo.

◆

Park Tool Co., a tool and die manufacturing firm, has been purchased by Minnesota Rubber Co. The purchased company will be merged with the parent organization and its facilities used to expand the capacity of Minnesota Rubber's Tool and Die Division.

◆

Greater flexibility of operation and better services will be provided by the consolidation of the Allison Division and the Campbell Machine Division of American Chain & Cable Co., Inc. The merged section will be known as the Allison-Campbell Division.

◆

Opening of a new district sales office in East Orange, N. J., for The Warner & Swasey Co. has been announced. George W. Herkner is the district manager.

◆

Liberty Aircraft Products Corp. now operates as the Liberty Aircraft Division of H & B American Machine Co., Inc.

◆

The organization of the Stretch Wire Corp. has been announced. The new corporation will make extensible cables for the electronic and electrical industries.

◆

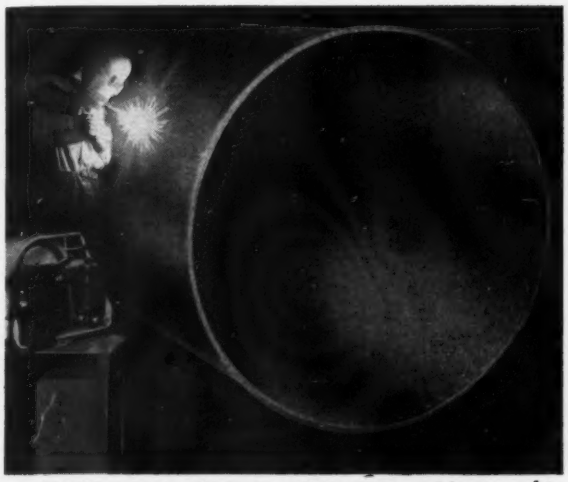
National Malleable and Steel Castings Co. is expanding to the non-ferrous field by acquiring the Grand Rapids Plating Co. and its subsidiary, Grand Rapids Die Casting Co.

◆

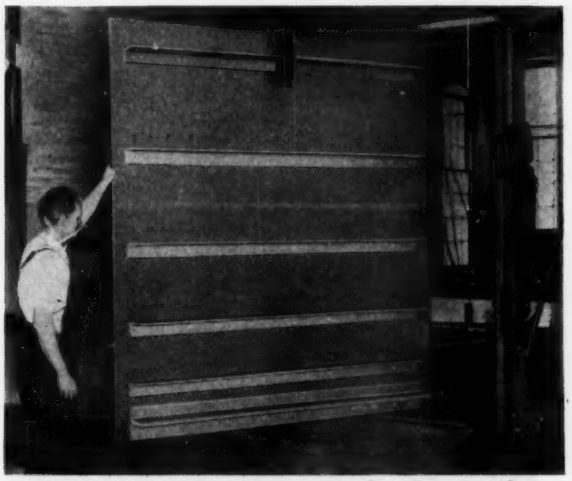
The newly created Special Machine and Fabrication Division of Composite Forgings, Inc. has recently expanded to specialize in the design, fabrication, and construction of heavy-duty special machines and automation equipment.

CUT CORROSION LOSSES

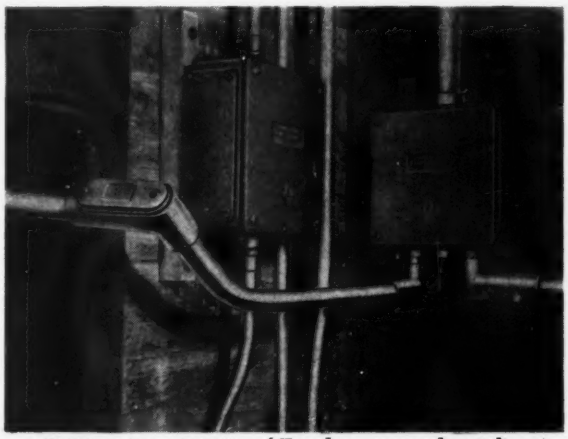
Get unusual corrosion resistance, plus high strength, toughness, weldability, and easy fabrication with Everdur,® Anaconda copper-silicon alloys



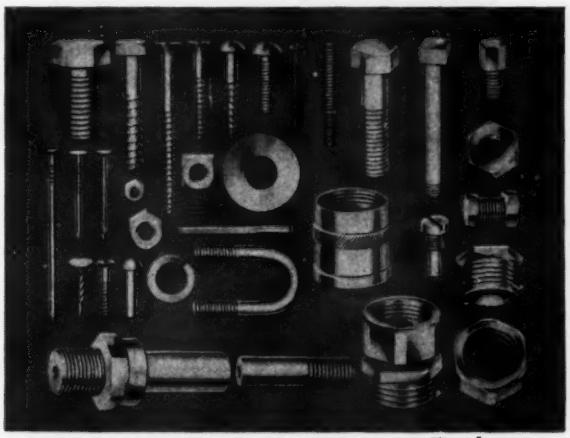
TANKS AND INDUSTRIAL EQUIPMENT requiring a combination of high strength, toughness and resistance to corrosion. Hot water storage heaters and tanks, unfired pressure vessels of Everdur are readily fabricated by welding.



IN WATER AND WASTE SYSTEMS, Everdur alloys provide easy fabrication and long service in a wide variety of jobs—from gates on to bolts and nuts. Their high strength makes possible lightweight, built-up assemblies of wrought metal.



ELECTRICAL CONDUIT of Everdur protects electric lines in corrosive environments, withstands vibration and abrasion —at oil refineries, in underwater tunnels (above), chemical plants. Made in two wall thicknesses—R.C. and E.M.T.



FASTENINGS AND SCREW MACHINE PARTS. Everdur is available in forms for hot heading and forging of bolts and accessories, severe cold-working operations for bolts and screws—and as free-cutting rod for screw machine products.

Whenever you have a tough problem calling for high strength with immunity to rust, and corrosion resistance equivalent to pure copper, consider an Everdur alloy. It may save you a lot of trouble and money. For details on properties and applications of Everdur alloys, write for Publication E-5. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5844

EVERDUR

COPPER-SILICON ALLOYS

products of

ANACONDA®

Made by The American Brass Company

CIRCLE INFORM-A-GRAM KEY NO. 67

Erickson Precision Expanding Mandrels Solve Machining Problems

Photo: Courtesy Ex-Cell-O Corporation, Detroit, Mich.

e. g. stainless steel aircraft sleeves

Tolerances of the highest order are required on aircraft sleeves. And when the material is stainless steel this can lead to production problems.

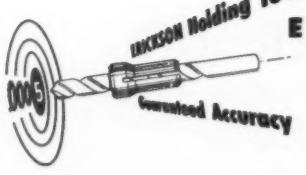
But Ex-Cell-O Corporation short-circuits their problems by using an Erickson 4½" C Drawbar Expanding Mandrel on an Ex-Cell-O precision boring machine. By using the Erickson mandrel they are able to machine completely the outside diameters, face a shoulder and put chamfers on both the OD and the ID of the exposed end. Production is up, rejects and scrap are down.

If you have a production part requiring exceptional tolerances . . . if instantaneous release feature can speed loading or unloading—Erickson Precision Expanding Mandrels can pay real production dividends.

AA-6723

Collet Chucks
Floating Holders
Tap Chucks
Indexers

See us at the ASTE Show
Booth 805



ERICKSON TOOL COMPANY

34351-4 Solon Road • Solon, Ohio

Tap Holders
Air-Operated Chucks
Expanding Mandrels
Special Holding Fixtures

Plagued by tough holding problems? Then let us show you how Erickson Precision Expanding Mandrels speed production and slash costs of machining, grinding, assembling or inspection. Write for your free copy of Catalog K today.

CIRCLE INFORM-A-GRAM KEY NO. 68

A Toolmakers' Square by D. B. & S.

FOR A BIT of early (toolmaking) Americana, I am usurping this April page to stake my claim as to being the only editor of a metalworking magazine who can boast of having, in his personal tool chest, a precision toolmakers' square of D. B. & S. vintage, and so etched and authenticated.

D. B. & S., young man, means Darling, Brown & Sharpe. And what gives me the opportunity to sound off in this manner is that in this year of 1958 our good friends, the Brown & Sharpe Mfg. Co., are marking their 125th Anniversary (1833-1958).

The history of today's Brown & Sharpe Mfg. Co. not only parallels the history of precision manufacture, but is rich in material contributions to the art.

It stems from the establishment, in 1833, of a partnership between David Brown, a maker of clocks, and his son, Joseph R. Brown, who had been proprietoring his own little shop for the manufacture of machinists' small tools and lathes. The partnership of David Brown & Son was founded upon a marked mutuality of interests.

In those days, when you needed a special piece of equipment you did not look for it in the yellow pages — you thought it through and then "fashioned" it yourself! Thus, in 1850, when Joseph Brown was pioneering in raising the standards of accuracy in machine shop products and operations, he built an Automatic Linear Dividing Engine so fundamentally correct in its design and of such skilled workmanship that today, it, and other machines of like design built during the following years, have not been superseded for their particular class of work.

His machines for graduating steel rules later led to the development and marketing of the Pocket Vernier Caliper — "The first practical tool for exact measurement . . . and its importance in the attainment of accuracy for fine work can hardly be overestimated."

On September 12, 1848, Mr. Brown's job book carried this momentous entry: "Lucian Sharpe came to work for me this day as apprentice."

On March 1, 1853, before the expiration of his apprenticeship indenture, Lucian Sharpe was made a full partner in the enterprise newly created under the name of J. R. Brown & Sharpe. Lucian Sharpe's contributions to the partnership were many and varied, and too numerous to chronicle here. For one, he conceived the idea of producing sizes of wire in a geometric progression. From this he dreamed up a comparatively low-priced gage for measuring wire and sheet — the American Standard Wire Gage, also commonly called the B&S gage.

An 1855 milestone of the new partnership was the building of a Precision Gear Cutting and Dividing Engine by Joseph Brown.

The following years were marked by rich accomplishments in the field of precision manufacture. These included the Universal Milling Machine (shown at the Paris Exposition of 1867), the Formed Cutter, the Universal Grinding Machine, and the Automatic Gear Cutting Machine.

In the spring of 1866, Samuel Darling, a master craftsman of machinsts' tools, including tool makers' squares, arrived in Providence by schooner from Bangor, Maine, bringing his entire equipment and a number of experienced workmen. This was for a joining of interests under the name of Darling, Brown & Sharpe — the marking on my cherished steel square is "D. B. & S. Prov. R. I."

Mr. Darling, like Messrs. Brown & Sharpe, was a stickler for the very highest attainable accuracy, never satisfied even with the degree of perfection which he attained. Over the next few years he made many contributions to the art of precision metalworking. Following his death in 1896, the name of the enterprise was changed in 1897 from Darling, Brown & Sharpe to the Brown & Sharp Manufacturing Company. Now we are arrived at the point where your own memory and knowledge of today's accomplishments can carry on. This year's 125th Anniversary of the Brown & Sharpe Mfg. Co. is another way of saying that "great oaks from little acorns grow."

Obviously (yes?), I did not buy my D. B. & S. toolmakers' square during those years of 1866-1897. I found it, in the late 1920's, in a Washington Avenue pawn shop in Minneapolis. It is in a well-nigh perfect state of preservation, and today, when checked against a master it will pass only the blue component of the daylight spectrum! Between handlings it has always been protected by a film of Houghton's Rust Veto.

One of these days, I'm going to overcome my sentimental acquisitiveness and send it to Brown & Sharpe's historical museum — my only chance to make like a philanthropist and patron of the precision metalworking arts.

E. Willard Pennington

editor

New Lamina Wear Plates Last Longer, Cost Less!

Now . . . save money and get better performance wherever you have sliding contact between flat metal parts! The principle of bronze electroplated on a steel backing originated with Lamina Bronze-Plated Guide Pin Bushings. Proven during countless millions of punch press hits, it is now being used successfully to produce flat wear plates.

This new concept in wear plate design combines the low cost, ready machinability and solid backing of steel with the long-wearing, non-seizing, free-running properties of a copper-tin bronze alloy. Lamina Bronze-Plated Wear Plates are flat, parallel, and can be easily machined to suit your application. Standard sizes available from stock. End costly wear problems and reduce expensive downtime now! Write for complete information.

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN

MANUFACTURERS OF LAMINA GUIDE PINS, BRONZE-PLATED BUSHINGS AND THE FINEST PRECISION PROGRESSIVE AND LAMINATION DIES.

SEE LAMINA WEAR PLATES, BUSHINGS AND PINS AT A.S.T.E., BOOTH NO. 929

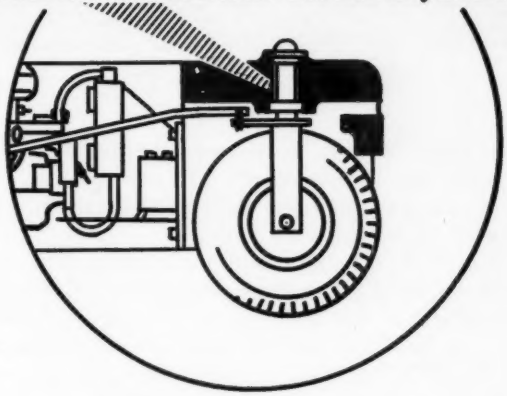
CIRCLE INFORM-A-GRAM KEY NO. 70

TOOLING & PRODUCTION Magazine

BORING HEAVY PARTS

. . . the easy way

The combined counterweight-steering housing of the Hyster Karry Krane was bored conventionally, at first. Production was slow and laborious. *See how they do it now.*



by William E. Hoffman
Associate Editor

A RECENT PROBLEM in Hyster's Peoria plant was to set up and bore a 5000-lb "slug" of cast iron. The boring consisted of approximately 10 operations using a number of heavy boring bars; two roughing bars and a finish bar are necessary for each of the large holes, plus those that are needed for the lesser operations, such as facing and chamfering. The holes, one 5.874″ dia and the other 4.125″ dia, are to be in line; and at assembly they receive cups for large taper bearings that work together.

Until a more satisfactory procedure could be devised, the operation was done on a horizontal boring mill; this quickly verified management's suspicion that this 5000 lbs of iron could not be "jockeyed" into boring position, a few thousandths at a time, within any reasonable production figure. Production time wasted here upped an otherwise good production picture, and not only was the cost of doing this operation overly high, but other jobs scheduled for the boring mill were held up. Also it was necessary for a bridge crane and its operator to stand by for loading, positioning, and unloading.

Ordinarily boring a hole of this size is no problem, but here the size of the casting dictates an exceptional reach into the part. And even though a through-hole was cored, allowing support at the end of the bar, chatter was present adding poor-finish woes.

Then too, the facing operations necessitated turning the part over or back-spotting. Since handling was the big production offender, they decided on back-spotfacing.

Figure 1 shows the part mounted for boring as it was originally done on the horizontal boring mill. Here the two major difficulties, the size of the workpiece and the boring bar reach, are clearly shown. Both pointed to the need for a different approach to the problem.

After much planning and discussion, a satisfactory solution evolved that is scheduled to pay for itself in a year. Figure 2 shows the answer — a trunnion fixture that allows for

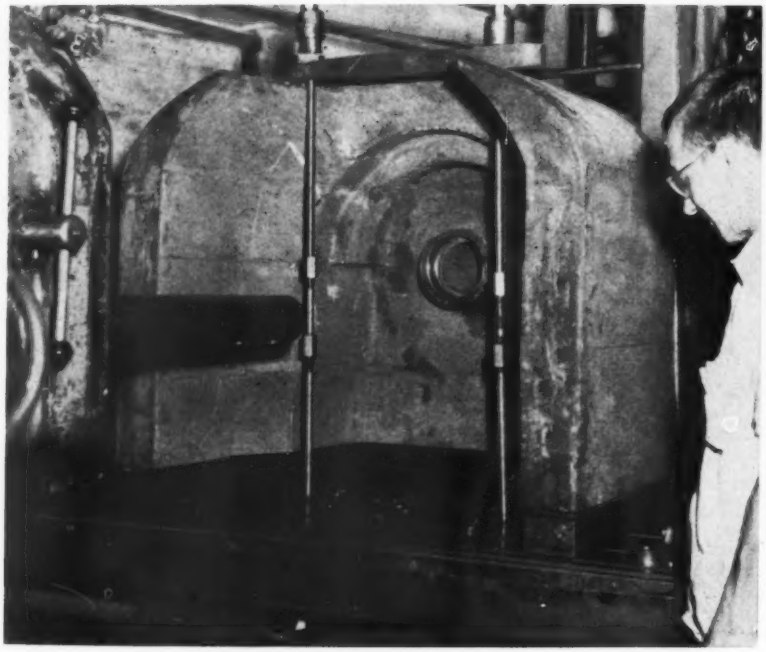


Fig. 1. A conventional boring mill setup for boring the large counterweight is shown with the exceptionally long bar needed to reach the boring area. Had the large bore been on the other side, boring could have been done from that side and a much shorter bar used.

easy quick loading; turn-over permits facing without the disadvantages of back-spotting; and roller storage areas are provided on both ends of the operation.

The roller conveyor sections have successfully solved the handling problem. It is not necessary for the crane operator to stand by to assist the machine operator in positioning the work. With this new arrangement four castings can be brought and deposited, one at a time, on the "part in" side of the conveyor. On his return trips the crane operator can remove finished parts from the storage area on the "part out" side of the conveyor.

It should be noted that the photograph in Figure 2 was taken when the trunnion fixture was not in production. Actually the operator is shown using the radial drill with its head swung into the adjacent work area where torque-converter housings are being drilled. Note also that the "part out" section of the roller conveyor is arranged to be set on the "part in" section when not in use. Due to this, a much larger work area is available when torque-converter housings are in production.

A drawing showing the relationship of the

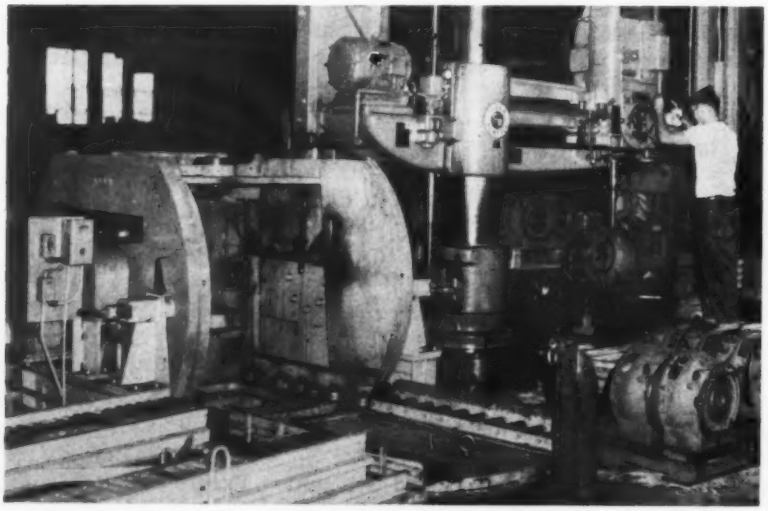


Fig. 2. The answer to the problem is this trunnion fixture. Its placement by a radial drill permits using the "radial" to drive the boring bars, which are piloted by the fixture. The radial drill is free, as is shown, to perform operations on other parts as production demands.

radial drill and the trunnion fixture, with its conveyor systems, can be seen in Figure 3. This equipment was positioned at one of the intersections of the plant's main aisles allowing for good circulation of parts to and from.

Figure 4 shows a part after it has been loaded and clamped in the fixture. For assembly to its chassis, the cast iron counterweight (workpiece) uses four threaded studs which are cast into the iron; these same studs are used to facilitate locating the casting in the fixture by the use of pilot holes in the back wall of the trunnion cage. The studs are not seen in Figure 4, but play an important part in cutting down positioning time. The Mathews Conveyor "ball transfer devices", used in the fixture, allow the heavy part to be rolled anywhere within the plane established by the balls, to easily position the part for entering the locating studs in the pilot holes.

Figure 5 shows the trunnion fixture after having been rotated 180° from the loading position to the first boring position. The turn-over is effortless in that the movement is brought about by a worm gear reduction driven by an electric motor. The fixture buildup has been counterbalanced so that no "fallover" is experienced when the center-of-gravity of the part passes over center. Although the gear reduction unit would have acted as a brake, had the counterbalancing been left off, a much lighter power and drive-train were permissible through counterbalancing. Index pins from both sides secure the cage to its frame in both the loading position (also the facing position) and the boring position.

Actually since the fixture has only two positions, positive stops could have been arranged so that the fixture could have been indexed from one to the other, and then back again,

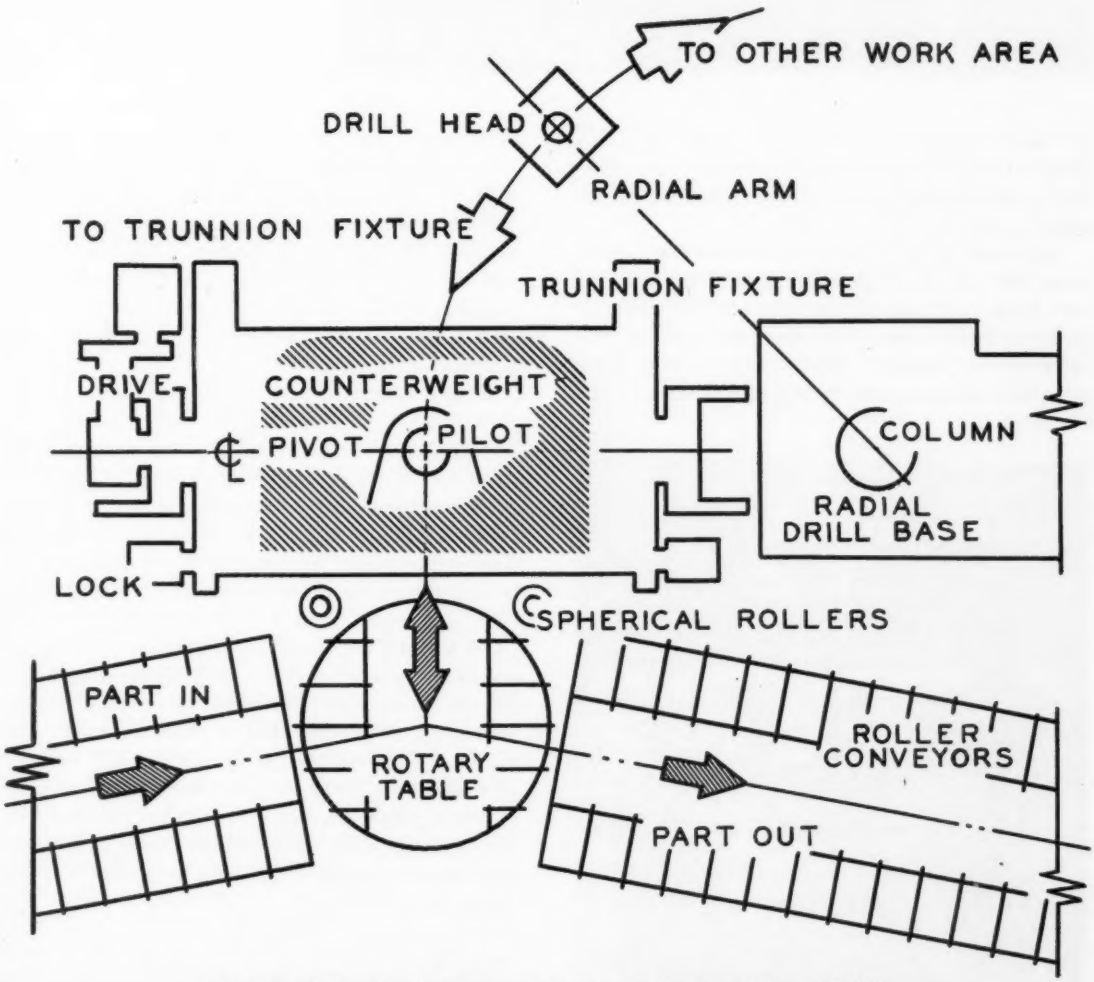


Fig. 3. Relationship of the counterweight boring fixture and the radial drill are shown in this plant layout sketch. The "part out" roller conveyor section, on the right, is placed on top of the "part in" section when floor space is needed.

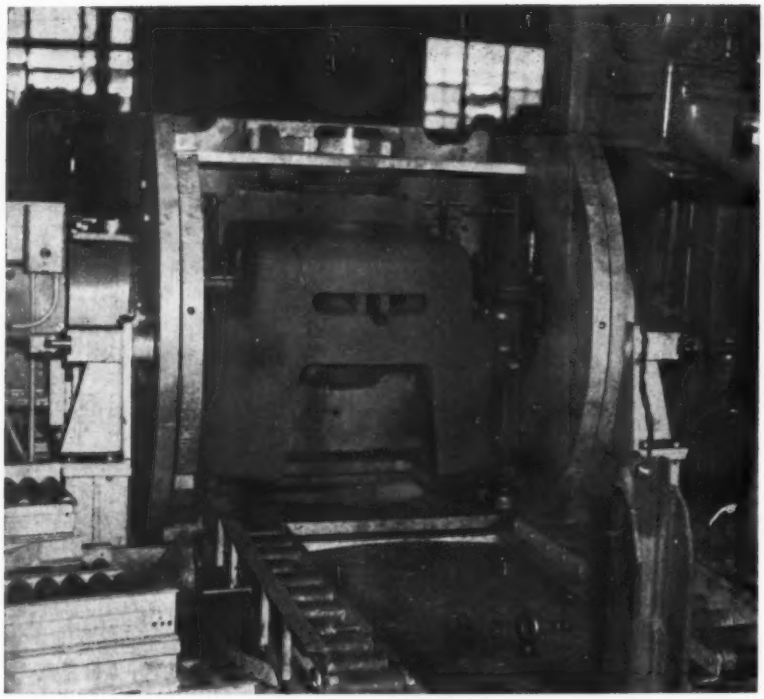


Fig. 4. Here the trunnion fixture has just been loaded and the part clamped ready for turn over. This is also its position for facing and chamfering after boring. These operations were previously done by the back-facing method.

without complete turn-over. However, this would have necessitated a more expensive drive arrangement with provisions for reversing the motor.

Although pilots are provided for the boring bars that would permit boring the main bores one from each side, it was considered judicious to bore both holes from the one side for the sake of alignment. Then due to the close quarters between the boring bar pilots and the workpiece, and to save time, it was decided that semi-permanent boring tools should be used. Tools that could be set and left in the bars between sharpenings speeded up the operation considerably, rather than insert the bar through the pilot and then the boring tool in the bar each time. This required grooves in the bores of the pilots to let the tools pass through.

Every effort to anticipate and allay future difficulties was considered. For instance, the boring bars were designed with longitudinal grooves in their peripheries to drive the pilot bushing by a key extending into the groove from the pilot. This saves wear on the boring bars and, when the operation approaches an out-of-tolerance condition due to bushing wear, they are replaced at a nominal cost.

By solving the handling problem, eliminating back-spotfacing, and by improving the finish of the holes, Mr. Alan Mann, Hyster Plant Manager, says they have: reduced their run time by 70%; reduced their boring mill load appreciably; reduced the machine burden charge for this job, by using a radial drill in place of the boring mill; and reduced inside finished part storage space since they are able to keep ahead of assembly. end

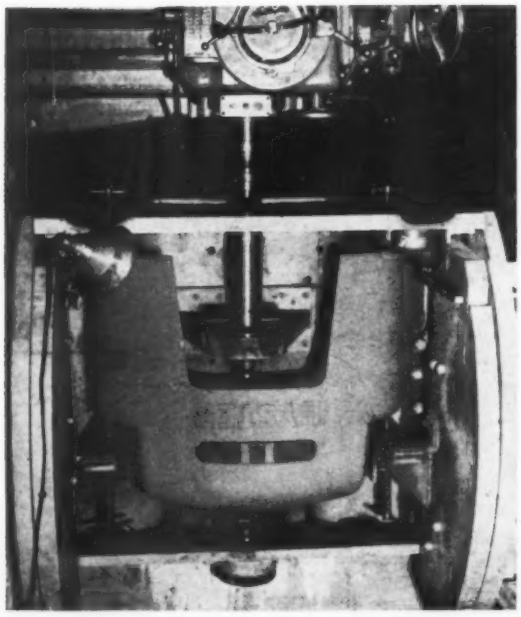


Fig. 5. This picture was taken after a boring bar was lowered into the pilot, and the radial drill head positioned for driving. Boring tools are shown projecting from the bar which will be lowered to the work by the radial drill.

The Application and Maintenance of

CARBIDE TWIST DRILLS

by Frank W. Curtis
Carbide Engineer
GREENFIELD TAP AND DIE CORPORATION
Greenfield, Massachusetts

STANDARD CARBIDE-TIPPED AND SOLID-CARBIDE twist drills should be designed for maximum output, long tool life and smooth, clean drilling. Tipped drills are made with hardened high-speed-steel bodies for maximum wear and service and to assure ample strength for the carbide insert. The hardness of the body provides an excellent bearing surface for drill bushings, as well as in the hole being drilled, thus assuring the utmost in performance. Solid carbide drills embody unusual strength and a high resistance to abrasion, and because they are very rigid will drill clean, true holes to size, surpassing in performance and accuracy any other form of drill.

The carbide blanks used on standard twist drills are C-1 and C-2, with the tougher grade being used for the larger diameters. Solid carbide drills are made from a C-2 grade.

Inasmuch as carbide embodies exceptional hardness, it has the ability to resist wear and to cut at high speed. With its hardness it does have brittleness, so that handling of either tipped or solid carbide drills requires precise care. At no time should drills be permitted to come in contact with each other or to contact other hard metal surfaces; because, if carelessly handled, the cutting edges are subject to chipping or other damage. Drills should be removed from machines with utmost caution and never be allowed to drop onto hard surfaces. Wooden boxes should be used at all times for transporting carbide drills to and from machines, and to the tool crib, or to the tool grinding department. When taper shank drills are mounted, a soft lead hammer or a wooden block should be used to apply the necessary impact.

Carbide twist drills are to be used only for drilling cast and malleable iron, non-ferrous metals such as aluminum, magnesium, die castings, and copper and brass alloys, and for non-metallic materials, such as plastics, hard rubber, fibre and similar products. Standard carbide drills are not recommended for drilling steel.

The high tensile strength of most steels requires a penetrating pressure at the point of the drill which usually causes fracture of the carbide at the web. The pressure also has a tendency to unwind the drill slightly under load, an action which is detrimental to the brazed joint of the ductile steel shank and the rigid carbide blank.

Resharpening Carbide Drills

One of the important rules to observe in using carbide twist drills is to re-sharpen them before they become excessively dull. Many drills break due to over-use, or in being allowed to get too dull; therefore, a safe life limit should be established and adhered to. A normally dull drill requires little grinding, but

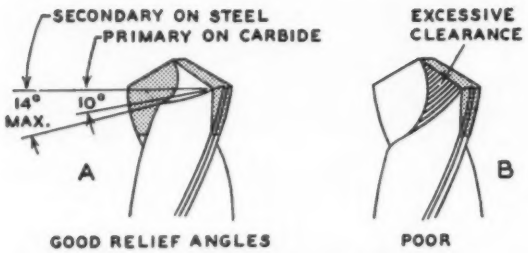


Fig. 1. The secondary relief angle should be held to a minimum of 3 to 4° more than the primary relief on the carbide as shown at "A". Excessive relief as shown in "B" is poor practice, and should be avoided.

an abused drill may require excessive grinding. Overall life can be prolonged by following this procedure.

Pointing of a carbide drill is of utmost importance. More than 90% of drill trouble can be traced to improper grinding of the point. Carbide drills will cut more accurately and last longer if machine grinding is used. A good drill may often work well in a poor machine, but an improperly ground drill seldom works well in a good machine. Hand grinding, unless done by an expert, should be avoided, because too many variables in pointing can contribute to unfavorable results.

The use of diamond wheels for repointing is preferable to silicon-carbide wheels wherever possible. A diamond wheel of 120 to 180 grit will be found suitable, and a wheel spindle that oscillates is preferable to one that is stationary, because grinding is distributed over the entire wheel face rather than at only one area, thus improving pointing and providing longer wheel life.

A slight secondary clearance can be ground on the steel portion of tipped carbide tools if desired to assure having the diamond wheel contact only the carbide material, as shown in the illustration in Figure 1. However, the secondary relief must be held to a minimum. If the carbide is relieved to 10° the steel should not be ground more than 3° or 4° beyond this relief, as at A. If the steel portion is ground away excessively as at B, the backing for the carbide insert is weakened, and breakage in use is likely to occur. Also, excessive grinding away of the steel affects the dissipation of heat into the steel body which normally is essential. Then, too, the braze is greatly weakened at a point where it should be strongest.

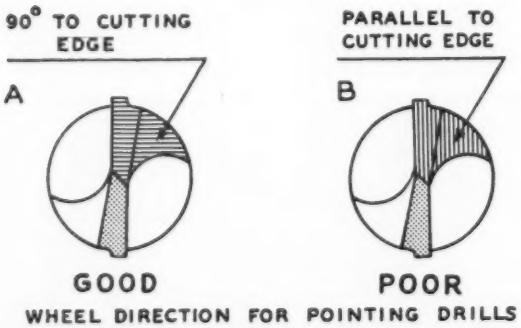


Fig. 2. The relief angle should always be ground with a wheel which passes at right angles to the cutting edge as shown at "A". Relief parallel to the cutting edge is harmful and should be avoided whenever possible.

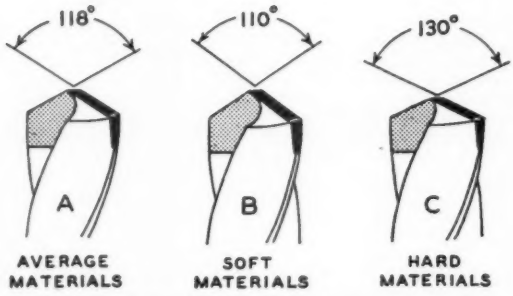


Fig. 3. "A" shows the standard 118° point for most materials. Soft materials can be drilled better with a 110° point, "B" and harder materials with a 130° point, "C". Normally, the clearance angle should be 10 to 12°.

Grinding of carbide drills should always be done so that the wheel passes at right angles to the cutting edge, as at A, in Figure 2. If grinding is done parallel to the cutting edges, as at B, small ridges are apt to be produced and flaking away of the cutting edges occurs. The direction of wheel rotation relative to the drill should be such that grinding action proceeds downward from the cutting edge.

Pointing Standard Carbide Drills

Most carbide drills are ground with a standard 118° point, as at A, Figure 3, and a lip clearance angle of about 10°, which finds broad use for a majority of materials. However, soft cast iron and other soft materials can be drilled with a point of 110°, as at B. As materials approach higher hardnesses, such as chilled cast iron, a blunter point of 130°, as at C, is often preferred.

The point angles of a drill must balance the transverse load, which means that a precision point is highly desirable in carbide drilling applications. If both lips are not ground at the same angle with the axis as at A, Figure 4, one lip will fail to counteract the tendency of the other to spring away from the cut; consequently, one lip will do more work than the other, which will result in its becoming dull rapidly, and it will be subjected to an abnormal torsional strain.

When cutting lips of a drill have the same point angle, but are of different lengths, as at B, the point of the drill will be "off center" or eccentric. As a result, the hole will be oversize to an extent equal to double the amount of this eccentricity.

If the drill point is ground both with lips at different angles and of different lengths, as at C, there will be a combination of the undesirable results as shown in A and B.

The chisel point of a carbide drill should be ground with an angle of 135°, as at A, Figure 5, for average materials, to facilitate penetration. This angle has been found to be satisfactory for drilling most materials suited to carbide drilling. The thickness of the web of the drill also has a direct relation in aiding penetration. Theoretically, the web has a crushing action rather than a cutting action; and, if the web is too thick in relation to the diameter of the drill, harmful excessive pressures can be exerted to the carbide point. Usually, as the drill is ground back, the web increases and a thinning grind is recommended. The normal thickness at the web varies with drill diameter from about 16% on small drills, around ⅛" dia, to about 12 or 13% or ⅛th of the diameter, on larger drills.

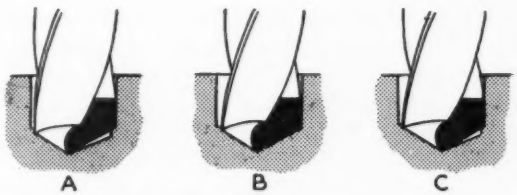


Fig. 4. Three errors in pointing which can cause trouble in drilling. "A" represents lips of unequal angles, "B" lips of equal angles but unequal lengths, and "C" unequal lips and angles; all of which should be avoided.

Web "mikes" should be used to check the relation of the web to the diameter, and thinning should be performed as shown at B, by grinding a nick on each side of the web, represented by the shaded areas. It is not advisable to grind away the web of the carbide too far below the point. In fact the carbide should be left as heavy as possible below the point to maintain strength. The two nicks should be blended carefully so as not to alter the cutting edge. Usually, this operation can be performed with a small, thin silicon carbide wheel of about 80 to 100 grit.

The table following will serve as a reference for web thinning carbide drills from ⅛" and larger, and represent the maximum thicknesses suggested.

WEB THICKNESS FOR CARBIDE DRILLS

Diameter of Drill		Web Thickness	
⅛"	0.125"	0.020—0.022"	16%
¼"	0.250"	0.038—0.040"	15%
⅜"	0.375"	0.052—0.056"	14%
½"	0.500"	0.065—0.069"	13%
¾"	0.750"	0.098—0.102"	13%
1"	1.000"	0.130—0.134"	13%
1¼"	1.250"	0.162—0.166"	13%

For intermediate sizes, estimate the average thickness of web between those listed. The approximate percentage of web thickness to drill diameter is shown at right.

Operating Suggestions

A carbide drill should never be used if it appears to run out. The cause of runout should be eliminated to prevent possible breakage. A drill should never be allowed to "ride" on a surface, because rapid dulling of the cutting edges will occur. Likewise, a carbide drill should never be "forced", inasmuch as the edges may break. Do not allow a drill to chatter or vibrate as these cause rapid dulling. If chatter develops, observe the point carefully; and, if it is ground correctly, the cause may be excessive speed or not enough feed, or a combination of both. If a coolant is used, be sure plenty is applied to completely submerge the drill. Insufficient coolant sets up intermittent heating and cooling which is harmful to the tool and workpiece. Always be sure the drill is properly chucked and firmly held because a drill that slips or stalls will break.

Speeds and Feeds

Many variables are encountered in drilling metals and non-metallic materials with either tipped or solid carbide drills. The nature of the material, the length of the hole, the rigidity of the setup, and the condition of the machine to be used are some of the factors that determine the speed and feed ratio to be used.

If a carbide-tipped drill is to be substituted for a high-speed-steel drill on a job already running efficiently, it is normally possible to

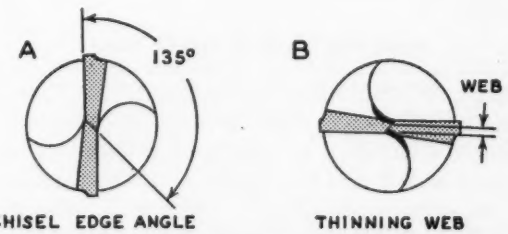


Fig. 5. Standard chisel edge angle is 135°, shown at "A", and is preferred for drilling most materials. Web thinning indicated by dark area at "B" should be performed when necessary, as shown in the table above.

about double the speed in feet-per-minute and to use the same feed-per-revolution. Such an increase in penetration would be possible only if all conditions were ideal, with the drill, the workpiece, and the machine offering the utmost in rigidity.

Since many drilling setups do have minor weaknesses, in one form or another, it is usually better to start with a slower speed and to build up to the maximum after trials indicate the job can be run faster. For this reason, recommended speeds for carbide drilling include a range in feet-per-minute, and with a new application it is advisable to use a conservative starting speed.

Cast iron, which is drilled extensively with carbide drills, varies considerably in structure, hardness and machinability, and often may vary in hardness within its own specified analysis, all of which have a direct effect on cutting speeds. The same would be the case with brass, aluminum, magnesium and copper alloys but to a lesser degree. The table of suggested speeds, shown here, should be used as a guide for obtaining the best average surface speeds, to assure maximum output with economical tool life.

SPEEDS FOR CARBIDE-TIPPED DRILLS

Material	Speed in Feet Per Minute
Cast Iron—Soft*	90 to 130
Cast Iron—Medium	70 to 100
Cast Iron—Hard	40 to 70
Malleable Iron	100 to 150
Non-Ferrous	150 to 400
Plastics	150 to 300
Non-metalics	150 to 400

*Soft cast iron = 150-180 BHN; medium = 180-220 BHN; hard = 220-300 BHN.

Smaller drills penetrate less per revolution than larger drills, because they are more fragile and because chip removal may not be as free as with larger drills. As in the case of determining a suitable cutting speed, it is better to start new applications with the lowest feed-per-revolution, and to increase the rate gradually if the job indicates a faster penetration can be used.

FEEDS FOR CARBIDE-TIPPED DRILLS

Diameter of Drill	Feed per Revolution
Up to 1/8"	0.001 to 0.003"
1/8 to 1/4"	0.002 to 0.006"
1/4 to 3/8"	0.003 to 0.010"
3/8 to 5/8"	0.005 to 0.012"
5/8 to 1 1/4"	0.008 to 0.015"

Factors influencing feed rates are the nature of the material and the depth of the hole being drilled. Harder materials use the lower feeds shown, because the penetrating force of drilling increases with hardness, and with too much pressure drill breakage may occur. On normal deep holes, where the depth may exceed three to four times the drill diameter, the lower feeds are advisable.

Solid Carbide Drills

Solid carbide drills have remarkable possibilities and their use in industry will increase as their overall abilities become realized. Contrary to the feeling they might be fragile, they are much stronger than tipped drills, but they do require proper care and maintenance. A solid carbide drill, being very rigid, will not drill oversized as many drills do; it will drill a true, smooth and accurate hole.

Solid carbide drills are not necessarily a replacement for tipped drills, but more for use in drilling holes where great accuracy is desired. Their design provides for more resharpenings, and if properly used will be economical in overall life. Solid drills often can be run slightly faster than tipped drills, because of their one-piece construction. Their life between grinds is usually high. However, they cannot tolerate any deflection or springing, and if used with bushings absolute alignment is very essential.

The application of solid carbide drills is similar to tipped drills, but a firm-gripping chuck to assure a positive drive is very necessary. Old chucks should never be used, because any slight amount of slip will result in breakage. Usually, small solid drills up to 1/8" dia operate at 60 to 100 fpm for average materials. Then the intermediate sizes up to 5/16" can be used up to 125 fpm, with the larger sizes up to 1/2" running from 110 to 140 fpm. Feeds vary with drill diameter; the table shows the average used.

FEEDS FOR SOLID CARBIDE DRILLS

Diameter of Drill	Feed per Revolution
Up to 1/16"	0.0005 to 0.002"
1/16 to 5/32"	0.001 to 0.004"
5/32 to 5/16"	0.002 to 0.007"
5/16 to 1/2"	0.005 to 0.012"

All drilled holes do not have to be finished within close tolerance, but many holes if made more accurately would contribute to a more precise product. Many parts are drilled in which the hole does not clean up after reaming; this is usually due to ductile tools, which can distort or deflect when in use. As a result, parts are rejected. Often rough-and-finish-reaming operations are required to clean up a hole, and sometimes even a final boring cut is taken to assure accuracy. Conditions such as these suggest uses for solid carbide drills. If

RIGIDITY IS IMPORTANT TO CARBIDE DRILL LIFE

ALL MECHANICAL STRUCTURES — whether tools, shafts, spindles or machine members — are subject to a certain amount of deflection when under load. The amount of deflection varies proportionately with the load and in relation to the projection or unsupported length of the member, which let us call "overhang". The greater the overhang, the greater the deflection; and, conversely, the lower the overhang the less the deflection under a given load. What is so often overlooked, however, is the fact that deflection varies by the *cube*, not by the *square*, as might be imagined. For example, if the overhang of a machine member is doubled, equivalent to a 2:1 ratio, the deflection will be increased 8 times, because the cube of 2 is 8! Now, if the overhang is cut in half, the ratio is still 2:1, so that the member then becomes 8 times stiffer.

It is the "cube rule" to remember regardless of ratio, because even a small amount can make a big difference. A 10% increase in overhang results in 1/3 more deflection with equal load. To arrive at a specific answer, take any number and cube it. Then add 10% to the same number and cube it also. The difference will be 33-1/3%. Let us apply the rule to an actual example, say a 1/2" dia. tool, projecting 2-1/8" from the end of the chuck, but by closer mounting the overhang can be reduced to 1-3/4". Offhand, the difference does not seem like much . . . only 3/8". But, cube 2-1/8" and 1-3/4", which come to 9.59 and 5.36, the difference 4.23 is about 44% of 9.59, hence reduction of overhang by 3/8" increases rigidity by 44%! And, that added rigidity would mean better performance, tool life, finish, and output.

Whenever you want to find out how much stiffness you add by reducing overhang, cube the two figures — what the overhang was and what it is reduced to — and the difference of the two sums, when figured as a percentage of the cube of the original overhang, will be the increase in rigidity percentagewise.

These references to rigidity are made merely to point out that deflection increases rapidly with overhang, and the stiffness is gained by reducing it. Deflection and chatter go hand-in-hand. When vibration exists, there usually is some way to stiffen the setup, whether through the tool, the jig or fixture, or the machine. A rigid setup is absolutely essential when using carbide drills, for carbide itself is non-ductile and cannot be deflected. It will break or fracture before it bends, except at high temperatures.

they can eliminate an operation, reduce rejects, provide a more accurate hole, with fewer tool changes, solid carbide drills have great economic possibilities.

Hard Steel Drills

While solid carbide or carbide-tipped *twist* drills are not recommended for drilling steel, *hard steel* drills — either solid carbide or carbide-tipped — with straight flutes are available that are designed specifically for drilling various materials usually classified as "unmachinable." Such materials include hardened die steels, hardened screws, and dowel pins with case-hardened surfaces. Material hardness should be from 40 to 60 Rockwell "C" or slightly higher; hard steel drills will work poorly in soft steels and should not be used for that purpose.

These drills should be operated at a speed of about 50 sfpm, at least within the range of 40 to 60 sfpm. Power feed may cause excessive drill breakage. Hand feed is preferred, so that the operator can feel the cutting action and sense when the drill is getting dull and needs resharpening. In drilling hard metals, it may be necessary to sharpen the drill frequently. Therefore, it is good practice to have as many good drills on hand as may be required to finish the job by merely changing drills rather than leave it for intermittent sharpenings.

When a hard steel drill starts to break through the underneath surface, the parts should be turned over if possible to complete the hole from the bottom surface.

A coolant should be used for drilling hard metals, sufficient to flood the drill. Preferred is a water-base coolant, such as a water soluble oil in dilute proportions, or a mixture of sal soda and water. Additive to prevent rust can be used if desired. The liquid is used as a coolant and not a lubricant; therefore, sulfur-base oils and other such lubricants should never be used. Drills should be withdrawn frequently, and chips removed.

end

Charts for Determining Milling Cutter Approach and Runout for Rapid Machining

by W. O. Becker
Staff Industrial Engineer
MERGENTHALER LINOTYPE COMPANY
Brooklyn, New York

Improved methods for saving engineering time are just as important as improved machining methods for reducing production costs. To save time in estimating, charts have been developed that eliminate formula computing.

DETERMINING THE TIME CYCLE for machining operations at Mergenthaler is a function of the methods engineers in production and cost estimating. The time cycle consists of handling time and machining time. Handling time has been set up as a predetermined time standard based on our actual shop experience.

The machining time is a purely mathematical function, taking into consideration: feed, speed, tooling, and the cut to be made.

On rapid traverse milling jobs, there are certain safety precautions that have to be considered. The sketch in Figure 1 illustrates a typical setup and shows the location of the dimensions that have to be determined.

Assume that the milling cut length taken on the workpiece is L. To arrive at the actual distance P that the table must travel under power feed, we must add the cutter "approach" A and cutter "runout" A_1; plus an air space factor for which we allow ¼" so that the cutter

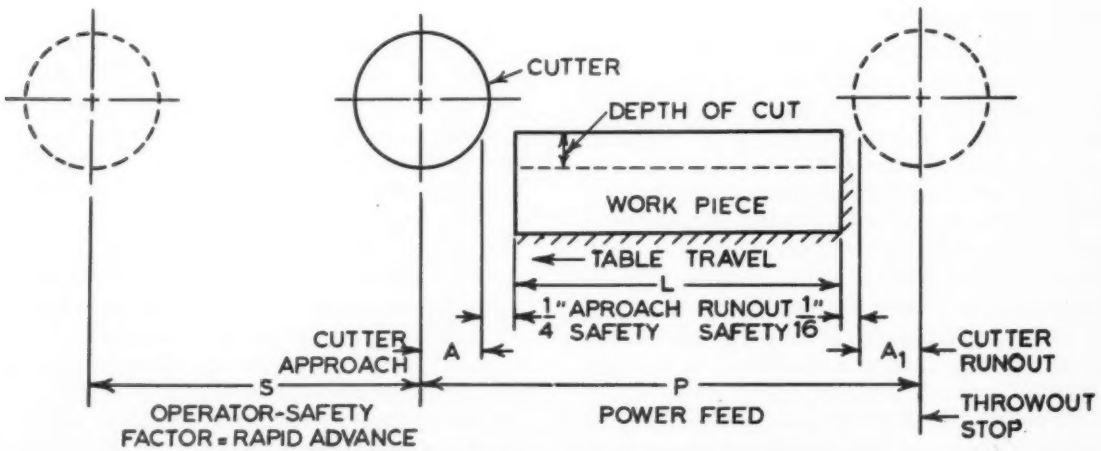


Fig. 1. Sketch of a typical milling setup, showing different positions of the cutter during a milling operation. It illustrates cutter approach, approach safety, cutter runout, and runout safety.

does not hit the workpiece when changing from rapid approach to power feed; plus an allowance, that we set at $\frac{1}{16}$", for safe cutter clearance on the runout.

Factors A and A_1 for plain, slab or side mills and saws are determined from the formula:

$$A = \sqrt{R^2 - (R\text{-}d)^2}$$

where

A = cutter aproach or runout
R = radius of cutter
d = depth of cut

Assuming a job called for a 5" dia slab cutter to be used in making a ½" depth cut. The cutter approach determined by formula would be:

$$A = \sqrt{2.5^2 - (2.5 - .5)^2}$$
$$= \sqrt{6.25 - 4}$$
$$= \sqrt{2.25}$$
$$= 1.501$$

To eliminate the time involved in working such formulas and to expedite the work of the methods engineers, Mergenthaler devised charts from which the value A is readily determined.

Solving this problem is simplified by using Chart 1. The 5" cutter dia is projected upward until it intersects the ½" depth of cut line. This point projected left to the cutter approach ordinate reads 1.5", the same value as determined by the formula method, but much simpler and quicker.

The cutter approach formula for face and end mills differs from the formula for plain, slab or side mills and saws. It is:

$$A = R - \sqrt{R^2 - \left(\frac{W}{2}\right)^2}$$

where

A = cutter approach or runout
R = radius of cutter
W = width of cut

Assuming that the cutter approach, A, is to be found for a job using a 5" dia cutter to make a 5" width cut, the value for A is solved by substituting in the formula.

$$A = 2.5 - \sqrt{2.5^2 - \left(\frac{5}{2}\right)^2}$$
$$= 2.5 - \sqrt{6.25 - 6.25}$$
$$= 2.5$$

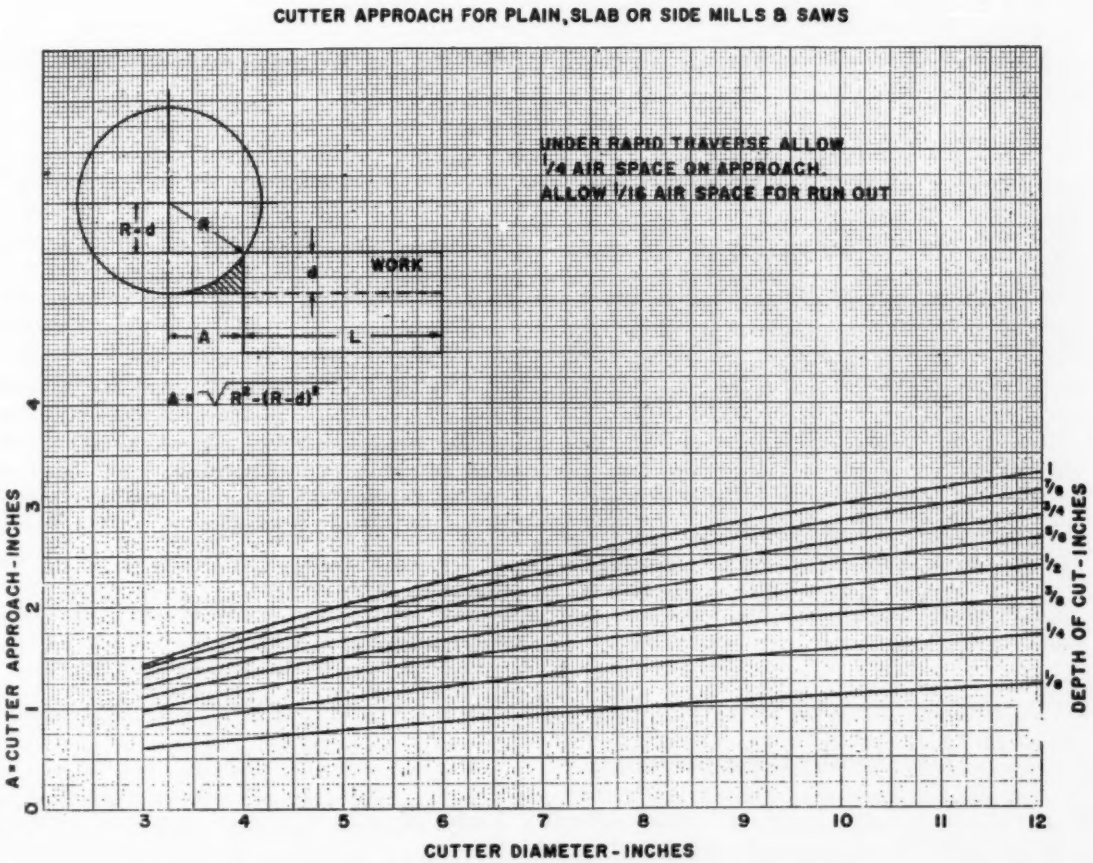


Chart 1. Used for determining the cutter approach value A, for plain, slab or side mills and saws when cutter diameter and depth of cut are known.

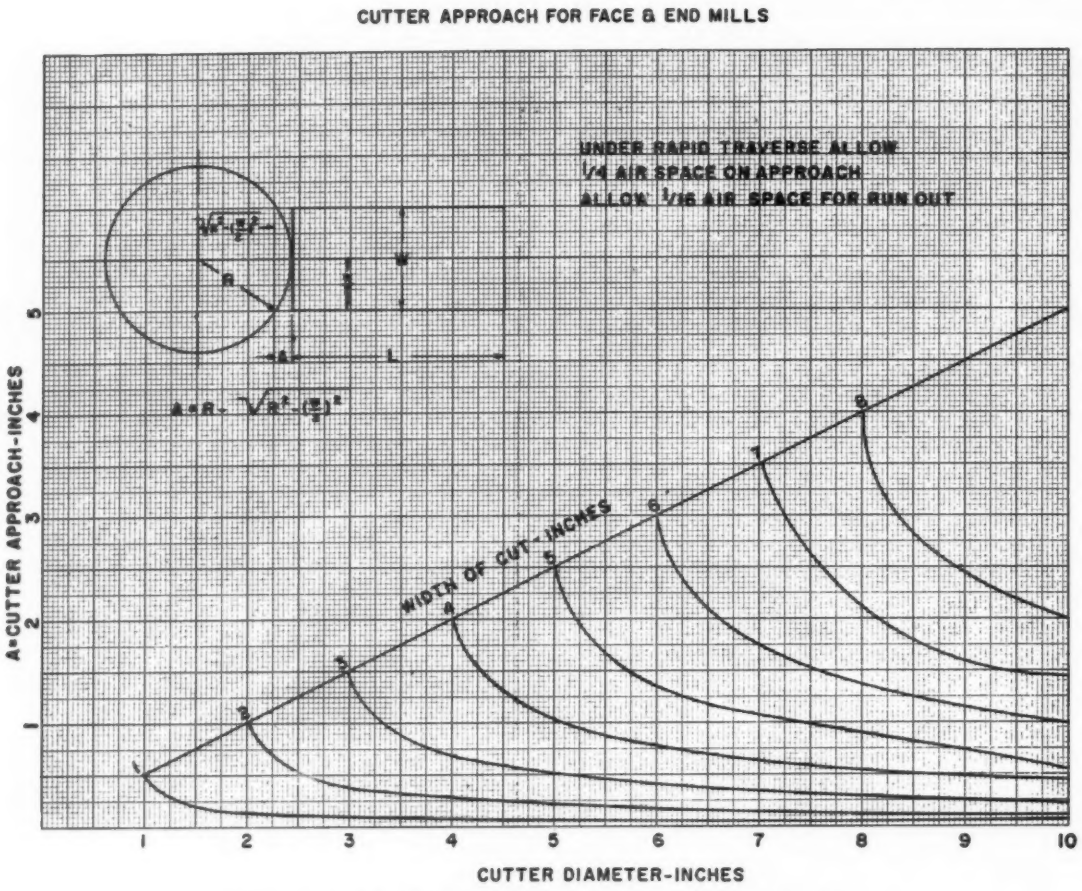


Chart 2. Used for determining the cutter approach value A, for face and end mills, when cutter diameter and width of cut are known.

Chart 2 is used to find the cutter approach for face and end mill tooling. To solve the same problem using the chart, the cutter diameter, 5″, is located on the base line of the chart and followed upward until it intersects with the width of cut curve at 5″. The point of intersection is then traced left to the cutter approach ordinate, on which is read 2.5″, the same value as found by the formula method.

Referring again to Figure 1, the distance S is a safety factor for the operator, so that he will not touch the sharp cutter teeth when unloading and loading workpieces in the fixture. This distance S we require to be covered under rapid traverse.

Milling fixture design at Mergenthaler, requires that the workpiece be secured against an end bank or stop for location and also to prevent its movement under thrust of the cutter. The tool designers are also required to be cognizant of the A dimensions and the ¼″ and 1/16″ dimensions to eliminate any possibility of having clamps, banks, or projections in the path of the cutter. The setup men also use this information in setting their throwout stop dog at the end of the power milling cycle. Once the fixture is bolted to the table, the throwout stop is set to the dimension A plus 1/16″ beyond the end bank and final adjustment is made on the tryout piece.

end

The Spotlight's on Quality

and Quality Control

in next month's TOOLING & PRODUCTION

ATTACHING CARBIDE TIPS TO STEEL BODIES

by Frank E. Montie
Cutting Tool Division
BROWN & SHARPE MFG. CO.
Providence, Rhode Island

AT THE PRESENT TIME there are several methods of attaching carbide tips to steel bodies. The most familiar are brazing, soldering, adhesives, and mechanical holding. In addition to these, there is also the method of fusion.

Before selecting the method to be used, it is necessary to decide how securely we want to hold the carbide to the steel. If it is to be used as a wear part, where there will be little shock or forces which might dislodge the carbide or heat it beyond the flow point of the bonding material, we can successfully use one of the low temperature alloys, an adhesive, or hold it by mechanical means. Any of these methods are desirable when it is necessary to attach long carbide wear strips to steel bodies that are odd shaped or thin in design, primarily because of the unfavorable changes the metals undergo when subjected to high temperatures.

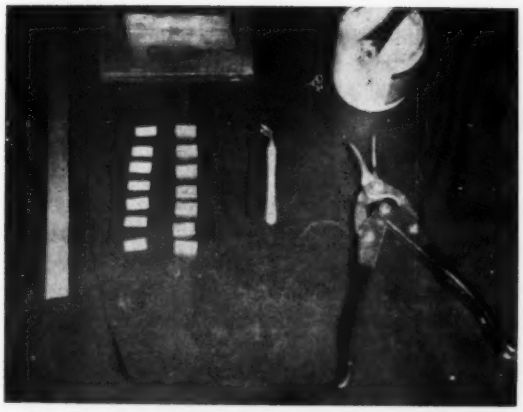


Fig. 1. Silver solder ribbon and rod, straightening block, flux tweezers, cutting shears, and tips, ready for assembly before brazing.

This month Brown & Sharpe celebrates its 125th Anniversary of distinguished service to American Industry. It is fitting that Mr. Montie's article should appear in this issue as exemplifying the B&S willingness to share with Industry the same techniques that have helped to produce high quality Brown & Sharpe tools and machines for many years.

—The Editors

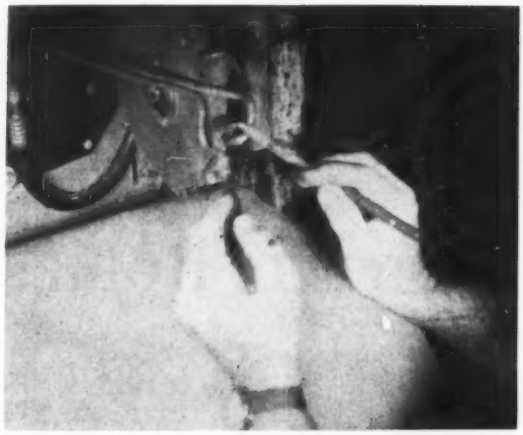


Fig. 2. Moving the tip with rods to wipe out air pockets and excess bonding material before setting.

Low Temperature Soldering

First, let us investigate the low temperature solders. Low temperature solders are now available which melt at approximately 400°F and flow at 600°F. This is called soldering as the temperature is less than 900°F. Temperatures above 900°F are considered brazing.

Liberal use of a proper flux is necessary on the parts to be soldered and the bonding material. The flux dissolves the oxides that form on the materials, allowing the areas to wet properly and effect a good bond. Flux will not remove oil and grease and will not wet a superfinished surface. It is extremely important in all brazing, soldering, and adhesive bonding to adhere strictly to the rules of cleanliness. Machined or ground surfaces are satisfactory providing they do not have torn spots or high and low areas. This would result in uneven thickness of bond thereby reducing the strength of the joint.

If a ground surface is to be used, the soldering or brazing should take place as soon as possible. If the ground piece is allowed to stand for several hours, more oxides will form on the surface than can be removed by fluxing. It is a safe practice to sandblast the ground surface and then clean all the materials used with one of the commercial cleaners that leave little or no residue, such as carbon tetrachloride. The soldering or bonding material and the steel body should not be touched at the area to be bonded as oily deposits are given off from the skin. Tweezers should be used to handle the tip and the bonding material. A clean surface is absolutely necessary to have the solder flow all through the joint area.

Heat may be applied by means of an induction heater or an oxyacetylene torch. Care should be taken to apply the heat evenly. Different types of flux are necessary for different bonding materials; so check with the manufacturer of the bonding material being used. As the piece is being heated, the flux will first have a drying appearance, then it will liquefy; it is at this point the solder will become soft and melt. When the proper temperature has been reached, the solder will flow.

By means of either a ceramic rod or the shank end of a file, the carbide should be moved back and forth to remove any air pockets or excess solder. The tip should then be positioned and held under pressure by means of the ceramic rod or file shank until the solder turns color and sets. The piece should then be placed in either powdered asbestos or mica and be allowed to cool slowly. Be sure to cover the tool completely; this is necessary because of the difference in expansion of carbide and steel. If this is not done, brazing strains may be set up that are not visible to the naked eye at this time but will appear when the carbide is stress-relieved by grinding in a future operation.

After the piece has completely cooled, the hardened flux may be removed easily by boiling the tool in water for a short time or by sandblasting. A good joint should have a 0.001 to 0.002″ thickness of solder. It is possible to obtain tensile strengths of up to 100,000 psi by the use of some of the low temperature alloys if the above procedures are followed closely. It may be well to note here that low temperature soldering or brazing is not generally recommended on carbide milling cutters, drills, or tools that are subjected to shock or extreme heat conditions.

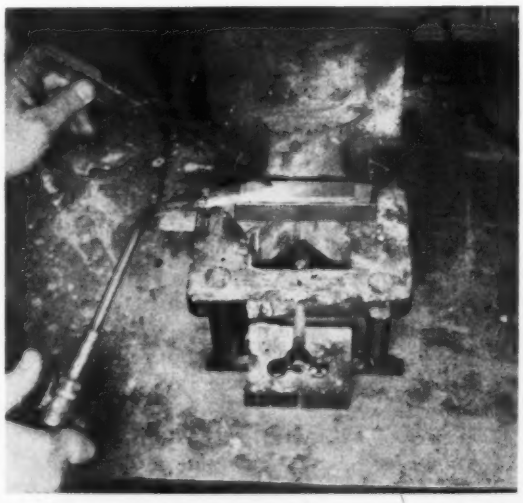


Fig. 3. Attaching wear strip to steel body with oxyacetylene torch using low temperature bonding material.

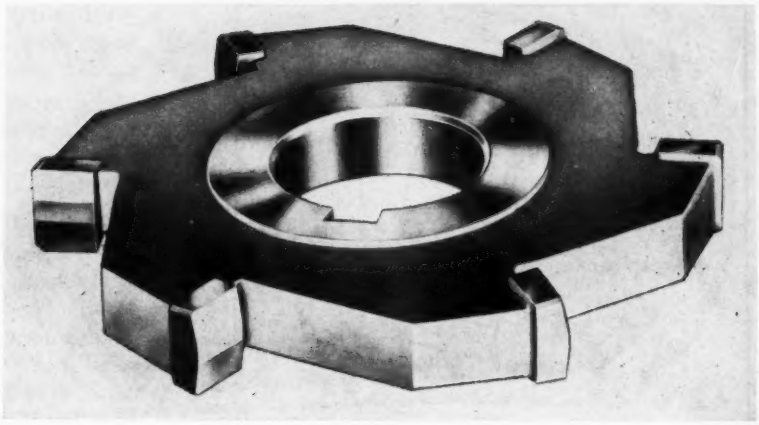


Fig. 4. This is a properly brazed cutter; note head of bonding material, free of voids, with good flow on steel body and carbide tip.

Adhesive Bonding

Next we can investigate attaching carbide by means of synthetic resin base adhesives. With the advent of ceramics for cutting tools, methods of attaching the ceramic tips to the steel bodies were sought. One of these methods is by use of synthetic resin base adhesives. Some of these adhesives give a surprisingly strong bond. For test purposes ceramic and carbide tips have been attached to milling cutter bodies and have stayed on the cutter through cuts in steel where excess heat was not generated. This is mentioned to point out the strength that can be obtained by some of these adhesives. There is a considerable amount of development being done on adhesives at the present time, and it would not be surprising to see one developed that could be used on production milling cutters as well as wear parts and single-point tools.

Adhesives are now available in the form of a putty which is ready to apply, or as a powder which can be mixed with an activator liquid to make any desired amount of adhesive at one time. The preparation of the parts to be bonded is quite similar to low temperature brazing or silver soldering. The surfaces must be free of rust, dirt, grease, plating and foreign matter, then washed with a cleaner such as carbon tetrachloride or acetone. The adhesive should be applied to the surfaces to be bonded. The amount applied should be adequate to fill any voids in the surface with a resultant film of 0.003 to 0.005″. Additional coats may be applied where thicker bond is desired. The parts may now be assembled and should be secured by means of holding devices to prevent any slipping during the curing.

Cure times and temperatures vary according to the adhesive being used. Generally speaking, the lower the cure temperature the longer time cycle necessary. Cure temperatures and times range from 70°F for 17 hrs to 450°F for 15 min. The parts can be handled in from 5 to 7 hrs but maximum strength is not attained for several days. These values apply to particular types of adhesives, so it is well to secure data from the manufacturer of the adhesive being used. Adhesives are being successfully used to attach ceramic and carbide tips to single-point tools as well as wear parts.

Silver Brazing in Common Usage

Silver brazing, the next method, is the most common type of brazing used to attach carbide tips to steel bodies. It is usually done by means of induction heating or oxyacetylene torch brazing.

Silver solder or silver solder attached to a shim is commonly used. Silver solder in ribbon form has a combination of silver solder and a shim of either nickel, copper, or copper and nickel alloys. It has been proven through experience that nickel or copper metals and their alloys are best for shim because of their strength, ability to relieve brazing stresses, and resistance to peening. The advantage of a material that contains the shim with the solder is obvious. It means fewer parts to handle and clean, also assurance of adherence of the solder to the shim material. Usually a combination like this becomes difficult to use because of its stiffness. A sandwich braze may then be made up of two pieces of silver on each side of a shim.

The greatest strength is obtained from 0.0005″ to 0.002″ thickness of braze which gives a tensile strength of 130,000 to 135,000 psi. The same conditions for the body and carbide tips apply to silver brazing as to low temperature alloy soldering and adhesives. Briefly, the requirements are a milled or ground surface, extreme care in cleaning, and proper fluxing of parts.

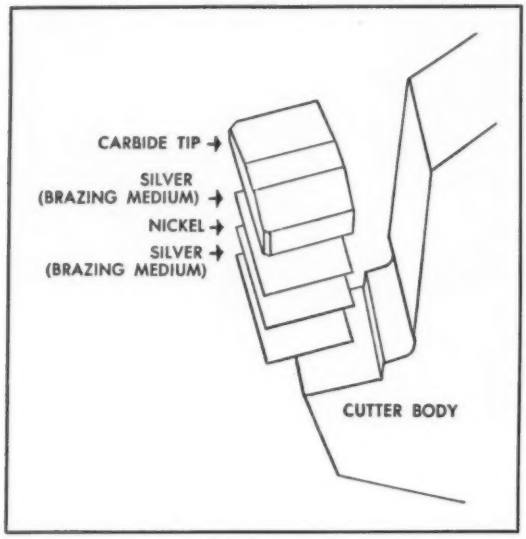


Fig. 5. Clear picture of shim, silver solder, cutter body, and carbide tip in the order required for assembly.

Fluxes used for silver brazing will generally remove oxides of chrome, zinc, nickel, and copper. Cast iron surfaces should be sandblasted before brazing. The flux goes through a number of changes during the heating cycle, which are good indicators of the progress. At 212°F the water boils off, at approximately 600°F the flux bubbles up and becomes puffy, at 900°F it starts to flow off, and at approximately 1100°F it becomes liquid and stays in this state up to 1500°F or 1550°F. If heat is applied for too long a period of time at 1300°F, or the flow point of the silver solder, the flux breaks down and becomes loaded with oxides resulting in a poor bond. One to two minutes maximum at flow point is desirable. Changes occur also in the silver solder; if the operator is not aware of this, it may also result in a poor bond. The silver solder melts at approximately 1100°F and flows at 1300°F. You must wait for this flow point before wiping in and setting the tip.

The brazing procedure, step-by-step, is as follows:

1. Inspect the steel body for a flat seat free of burrs and excess areas of contact other than where the tip is to be set.
2. Cut silver and shim, or silver-and-shim combination, to approximately the same size as the tip to be attached.
3. Pound shim and silver on flat surface with a flat piece of steel to straighten and remove cutting burrs.
4. Clean surface of carbide tip to rest on seat (in steel body) on a diamond wheel, or sandblast.
5. Wash silver, shim, carbide tip, and steel body with a commercial cleaner such as carbon tetrachloride.
6. Make up sandwich by using tweezers; do not touch with fingers. Be sure to cover each part thoroughly and separately with flux.
7. Flux steel body and put in holding device.
8. Place tip and sandwich on steel body and apply heat. It is sometimes necessary to pre-heat the steel body if the area is large. This is done to prevent rapid dissipation of heat into the large steel body from the small area heated to brazing temperature, as it would set up brazing strains and cause cracks in the carbide.
9. After brazing temperature is reached and the silver flows, the tip and the shim should be moved independently of each other to wipe in the braze removing any excess bonding material and air pockets. The tip should now be positioned and held under slight pressure with the ceramic rod or file shank until the color of the silver changes and sets; proceed to the next tip.
10. Upon completion of the piece, remove it and bury it in asbestos powder or mica to cool slowly.
11. When the piece has cooled sufficiently to handle by hand, wash off the excess flux with water or sandblast, and inspect braze. A good braze will have an even head around the edges of the steel body free of voids and should be a soft gold color.

    If the heat is applied by means of an oxyacetylene torch, the flame should not be directed on the carbide tip; it should be directed on the steel body beneath the tip and brought up to brazing temperature.

Fusion — Process to Come

Fusion is another method of attaching carbide tips to steel bodies. In this process, as the name indicates, no bonding material is used. The two metals actually fuse together. This is done by bringing the molecules of each metal to the melting point very rapidly. At the present time methods are being developed to do this operation. Because of the difference in coefficient of expansion of steel and carbide, many obstacles must be overcome. Development has fused some tips successfully to some types of steel. This process has not yet advanced sufficiently to include in this writing as an available means to attach carbide tips to steel bodies for practical cutting applications; however, it is mentioned because of its real possibilities for the future. end

With Adequate Facilities

Contract Stamper Produces Complete Assemblies

by Howard Nieberding
Superintendent
AMERICAN STAMPING COMPANY
Cleveland, Ohio
as told to
Carl F. Benner
Associate Editor

MECHANICAL UNITS that perform a definite function on automotive vehicles usually vary in their design and construction by the different vehicle manufacturers. Specifically, automotive brake backing plates are similar basically, but have components that differ widely in design and construction.

An automotive backing plate, assembled with anchor bracket, spacer plate, reinforcing plates, and finished with a coat of paint, constitutes one type of complete unit, ready for axle assembly (Fig. 1).

In the plant of any automotive vehicle manufacturer or parts supplier, the procedure in building backing plate units could follow a typical production pattern of blanking and drawing the basic plates, then sending them to storage. The other components — anchor brackets (either castings or forgings), spacer plates, and reinforcing plates — are made available either by their own production facilities or purchased outside. These also are sent to

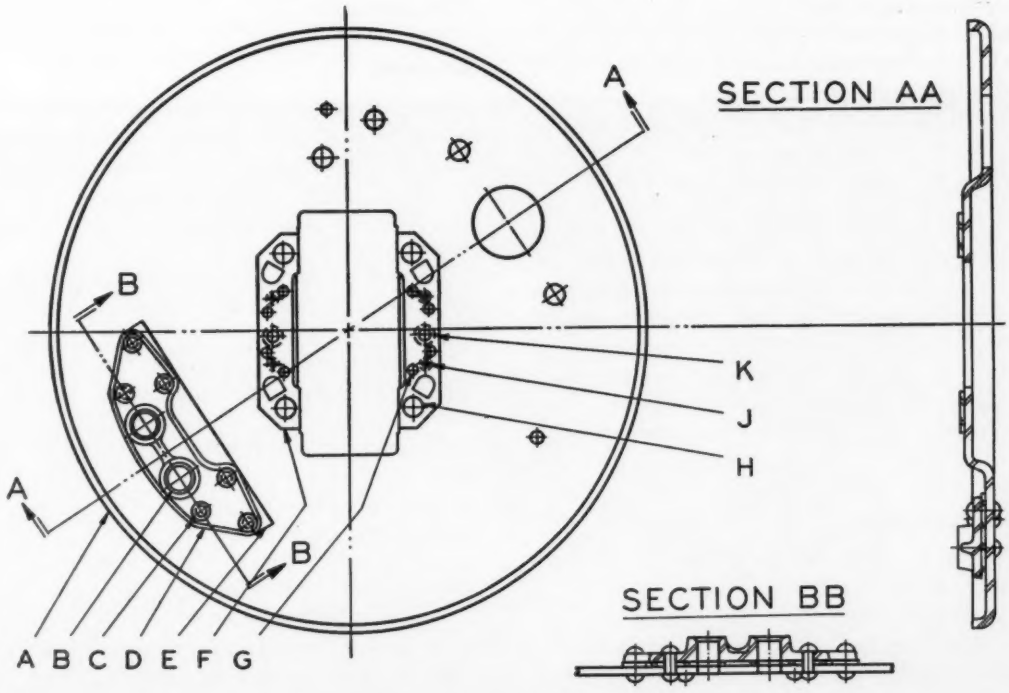


Fig. 1. An automotive brake backing plate is shown with its various components assembled and fastened in place by riveting and projection welding.

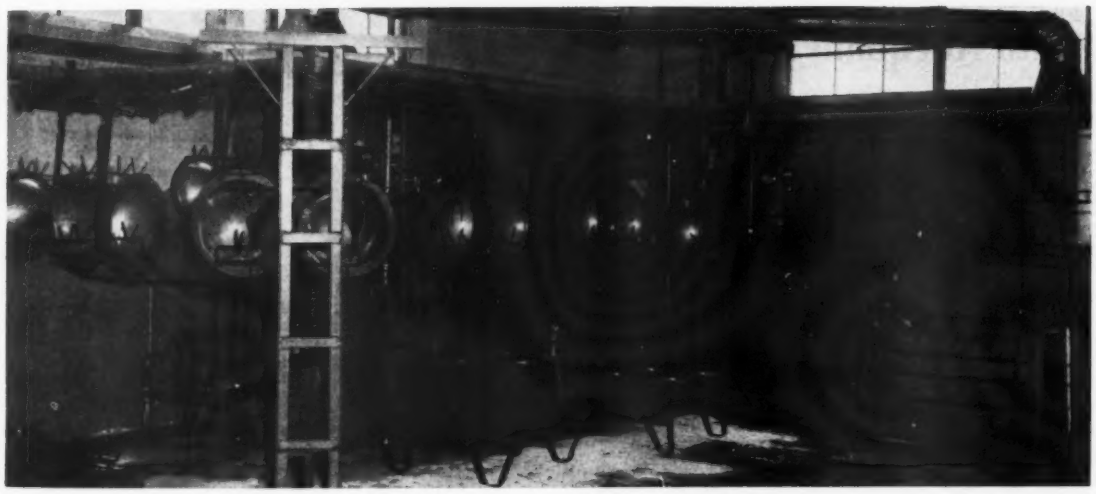


Fig. 2. Loading station of the conveyor system serving the spray painting operation at American Stamping.

storage when received.

When backing plate units are required for the production of axles, these parts are drawn from storage, assembled into units as specified, and painted.

It is the experience of some manufacturers and parts suppliers that it is more economical to contract for these units with a company that is sufficiently equipped and specializes in stamping and drawing as well as experienced in assembling, finishing and production painting, than to fabricate them in their own plant. Storage and material handling charges and release of expensive equipment for other work are factors that enter into the production costs of this axle component.

One type of backing plate unit fabricated by the American Stamping Company for an automotive parts supplier is shown in Figure 1.

It is made up of: one backing plate, A; one anchor bracket, D; one spacer plate, E; two reinforcing plates, F; and six rivets, C. For this particular line of units, the anchor bracket is of standard design and size. When the height of the anchor bracket is required to be of greater height than the standard, a spacer plate is assembled under the anchor bracket. This accounts for the inclusion of a spacer plate in this unit.

Press Operations

The press operations performed on the basic plate by American Stamping are:

1. Shearing steel plate to required size.
2. Blanking the plate to specified diameter.
3. Forming plate complete.
4. Piercing all holes, except those to be drilled and tapped at assembly.
5. Broaching center hole.

Separate dies are used for performing the blanking, forming, and piercing operations. A basic die has been built for each of these operations with provisions incorporated for the installation of inserts. The inserts provide accommodations for any changes that might be made in the design of the backing plate, such as plate change in depth and outside diameter.

American Stamping has determined that the separate die method is the most economical for this particular job.

Assembly

The assembly department at American is equipped to perform drilling, tapping, reaming, riveting, broaching, spot facing, chamfering, welding, and projection welding. All of these facilities are used in the assembly of the backing plate unit.

The secondary machining and assembly sequence for the backing plate unit shown in Figure 1, is:

1. Projection welding the two reinforcing plates, F, with four welds on each plate as shown at G.
2. Reaming four previously punched holes at H.
3. Drilling two holes at K.
4. Drilling four holes at J.
5. Deburring these 10 holes at H, J, and K.
6. Tapping two holes at K.
7. Tapping four holes at J.
8. Riveting the anchor bracket, D, and spacer plate, E, to the backing plate, A. The shape of the anchor plate is well defined by sectional views A-A and B-B. It is either a casting or

forging and is received at American with the rivet holes in place. Six holes were previously punched in the backing plate, A, to take the rivets. In making this assembly, the six rivets, C, are inserted in the punched holes from the underside; thus, the rivet heads are located on the bottom side of the plate. The spacer plate is set over the rivets first and then the anchor bracket. This assembly goes into a die mounted on a punch press and with one stroke of the press ram all six rivets are peened.

9. Drilling and reaming two holes, B, through the anchor bracket.

10. Spot facing and chamfering two holes, B, in the anchor bracket.

11. Painting entire unit with black enamel.

Painting Department

The painting department is the most recent addition in American's expansion program. It includes complete spray washing and phosphatizing facilities, dip tank, 250' of overhead conveyor equipment, spray painting booth with water curtain, infra-red drying booth, and unloading facilities.

The loading station is shown in Figure 2. With a short travel the conveyor, loaded with automotive parts, turns and enters the spray washing booth. Figure 3 shows the parts entering the spray booth and passing the operator who sprays from 200 to 500 pcs/hr depending on size of the part and whether one or two sides are sprayed. In Figure 4, the parts on the left are shown entering the spray booth area. After spraying, the conveyor takes the parts on a circuitous paint drying route. At the right is shown the parts coming through the infra-red drying booth and being unloaded.

Fig. 3. Automotive parts passing through the spray painting booth. Operator sprays an average of 350 pcs/hr. Water curtain is shown that traps the overspray.

Some paints are quick drying enough so that the conveyor travel time is sufficient for the sprayed parts to be completely dried, without an assist from the infra-red lamps, when they reach the unloading station. With other paints that are slower drying, the baking effect of the infra-red lamps is required, in addition to the conveyor travel time, to dry the parts sufficiently for handling at the unloading station.

Another type of brake backing plate unit is shown in Figure 5. The components that make up this unit are: backing plate, A; anchor reinforcing plate, B; boot retainer, E; and cable ramp, F.

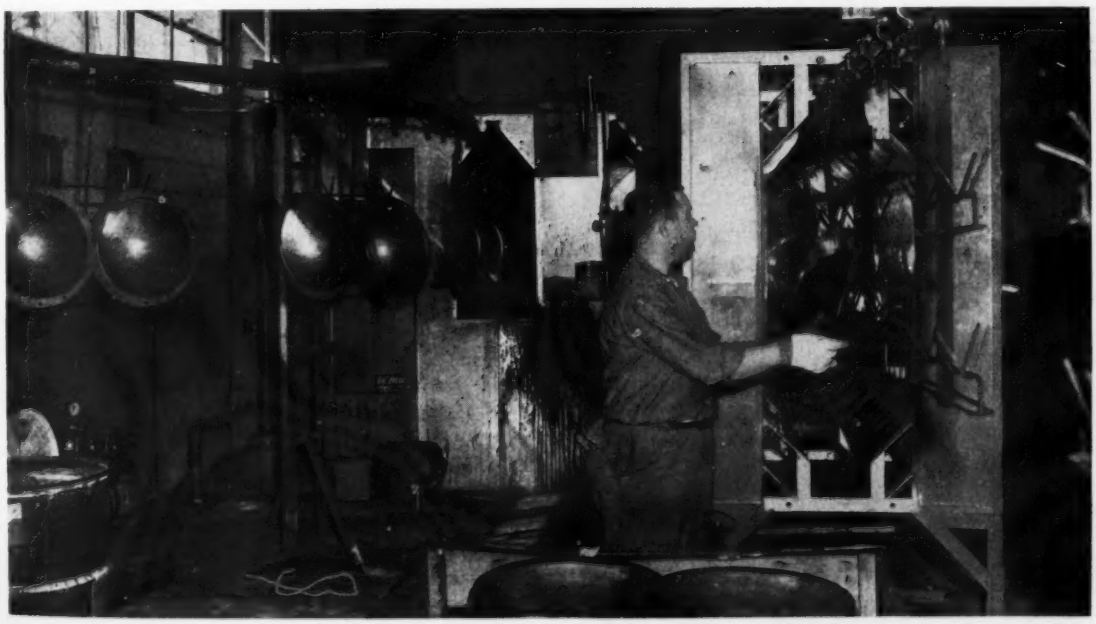


Fig. 4. Unloading parts as they emerge from the infra-red drying booth.

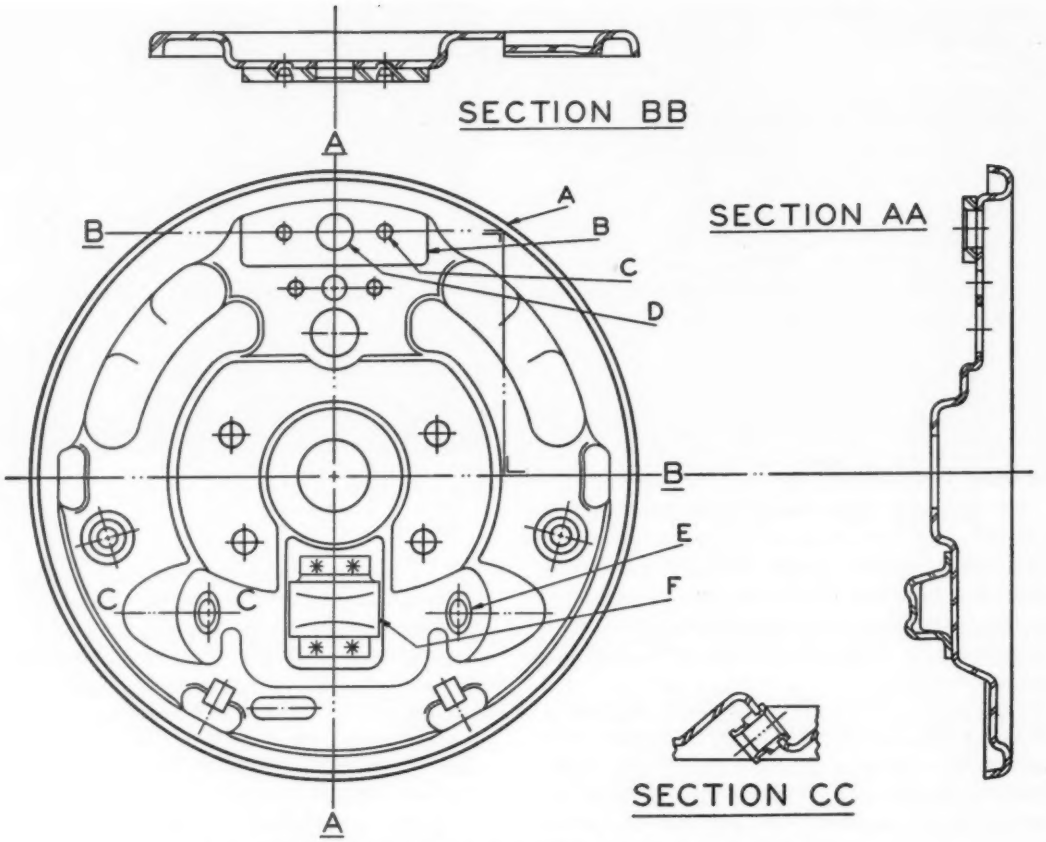


Fig. 5. This backing unit differs in design and construction from the one shown in Figure 1. Fastening the components to the basic plate is performed by projection welding and crimping.

Press Operations

The press operations performed in forming this backing plate are:

1. Shearing material.
2. Blanking and first forming.
3. Second forming.
4. Shearing form and coining.
5. Trimming.
6. Flanging and restriking.
7. Piercing all holes in the horizontal plane.
8. Piercing side holes, angular, at E.

Assembly

A rundown of the machining and assembling sequence for the unit shown in Figure 5 is:

1. Projection welding the anchor reinforcing plate, B, to the backing plate A. The anchor plate is made of steel, and has one large hole, D, punched through. In the same punching operation, two small holes, C, are embossed on the top surface of the plate that results in two projections being pushed through on the under side. The projections are spaced so that they match two holes previously punched in the backing plate. Thus, they serve as anchor plate locators; and at the same time, they furnish material for the projection welding operation.

2. Assembling the boot retainer, E. The boot retainer is made up of a piece of steel tubing inserted and securely crimped in the drawn angular housing, illustrated at section C-C. A crimping fixture set up on a punch press facilitates the crimping operation.

3. Projection welding cable ramp, F.

4. Reaming and countersinking hole, D.

5. Straightening backing plate. A straightening die is used in this operation. A striking blow levels the part to blueprint specifications.

6. Washing and phosphatizing the whole unit. Phosphatizing is a spraying process that furnishes a complete finish or serves as an undercoat for future painting.

These units travel the same conveyor drying route as earlier described.

To facilitate the shipping of these units, they are either packed in the customer's or American's own pallet crates for lift truck handling and transportation. They are delivered on a schedule that enables the customer to hold storage time to a minimum. end

With Electronic Actuator

GRINDING OPERATIONS ARE CONTROLLED TO WITHIN MILLIONTHS

THE VERY NATURE of anti-friction bearing applications is defined in terms of tolerances in "tenths", micro-finished surfaces, and extreme uniformity of every component. The problems of bearing design, materials, and mass manufacturing have progressively mounted in this age of high-powered automobile engines, jet airplanes, guided missiles, electronic computers, and nuclear reactors.

More complex gadgets to perform more intricate maneuvers, confined within constantly shrinking space and weight allowances are the order of the day. The same bearing, or even a smaller one, is expected to carry a much higher load. About the only way to keep up with these constantly rising bearing performance requirements is to further refine the bearing and build it to still closer tolerances.

The Torrington Company, Torrington, Conn., has long been an outstanding leader in the manufacture of precision anti-friction bearings. Maintaining close tolerance specifications on a high-speed assembly-line operation presents many problems, but the company not only has met each new demand for closer precision, but, in most cases, bettered them by a satisfying margin.

One of the significant problems coinciding with the closing down of tolerances is the matter of human fatigue which, of course, is cumulative as the work day progresses. Torrington's dual objective then is to attain even greater precision in its bearing, without reducing production rates, and in ways that would relieve the machine operator of as many of the fatigue-producing factors as feasible.

One area to come under scrutiny was the centerless grinder line where needle bearings are ground to size and finish before assembly into finished needle roller bearings.

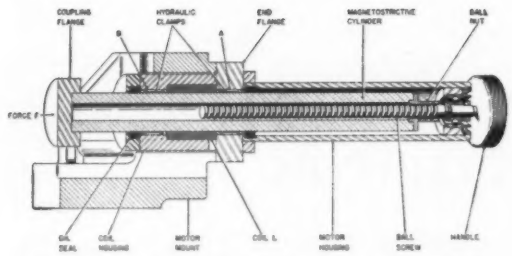
Each needle bearing to be ground is carried on a work rest and positioned between two rotating wheels — a regulating wheel which controls the rotation of the part, and a grinding wheel which does the actual grinding. The size of the finished part is determined by the distance between the two wheels. Adjustments to achieve the desired part size are made by moving the regulating wheel toward or away from the grinding wheel. The conventional method of moving the regulating wheel is for the machine operator to rotate a hand wheel on the end of a lead screw.

When the regulating wheel slide is stationary, the force that must be exerted to start its movement is greater than the force required to continue the movement; the result is that the wheel slide does not move immediately as the operator begins to turn the hand wheel. Instead, the lead-screw "winds up" somewhat like a spring, until sufficient force has been accumulated to overcome the static friction of the wheel slide; then the slide lurches forward, frequently by an amount greater than the desired correction. This stick-slip characteristic adds to the difficulty of making precise adjustments to control the part size.

These disadvantages of the conventional lead-screw method of controlling the grinder were overcome at Torrington by removing the lead screw and replacing it with an Inchworm Motor, a development of Airborne Instruments Laboratory. The Inchworm uses a novel physical principle called "magnetostriction" to achieve precise movements of heavy loads over minute distances.

The base of the Inchworm Motor is bolted to the bed of the grinder, and the magnetostrictive armature is attached to the wheel slide. Thus, movement of the armature through the clamps moves the wheel slide backward or forward as desired. The minute

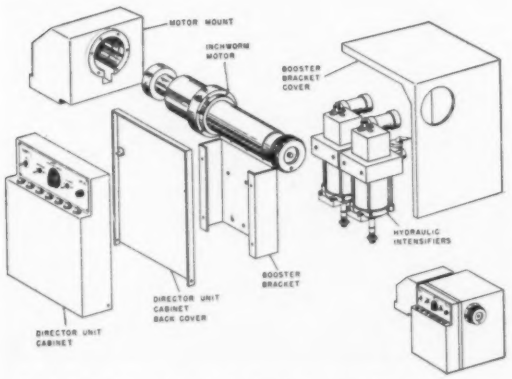
Inchworm installation at Torrington's needle bearing plant controls centerless grinding to consistent accuracy, within millionths.



Cutaway view of the Inchworm motor, a linear actuator which replaces the lead screw in mechanisms requiring micro-inch dimensional controls.

movements can be as small as 0.000005″, or as large as 0.0001″. In its most elementary application, the Inchworm is pushbutton-controlled by the machine operator approximately every 15 sec on roughing cuts, less frequently on finish cuts. To make the operation completely automatic, electronic gaging equipment was added, capable of accurately determining when a wheel adjustment was necessary and transmitting the necessary instructions to the control mechanism. Airborne has developed standard units for this purpose.

As each part is ground, its size is automatically measured to within a few millionths of an inch, and the *measured* size is automatically compared to the *desired* size. The information is transmitted to an "electronic brain" which weighs a great many factors and makes its decision instantaneously. For example, it decides that no correction should be made if only one part is the wrong size, since this may possibly be the result of an accidental occurrence that will not be repeated on subsequent parts. If successive parts are of the wrong size, however, the brain will make the necessary correction. The distance the wheel slide must be moved, and the direction, are dependent upon factors such as the size of the error in part size, the length of time since the last previous correction, and whether the part is under-size or over-size.



Exploded view of basic Inchworm assembly as applied to centerless grinders. Inchworm system corrects both mechanical and human errors.

HOW THE INCHWORM WORKS

MAGNETOSTRICTION IS THE EFFECT THAT OCCURS when certain alloys are subjected to a magnetic field — the magnetostrictive material lengthens or shortens, returning to the original length when the magnetic field is removed by turning off the current in the coil of wire.

On the Inchworm magnetostriction is combined with a pair of hydromechanical clamps. Motion is produced by shrinking the magnetostrictive armature while the clamp at one end is locked and the one at the other end unlocked. This allows one end of the armature to move. The opposite clamp is then locked while the first one is unlocked and the armature is expanded by removing the magnetic field. The result is a net longitudinal motion of the armature. The motion may be either forward or backward, depending upon the order in which the clamps are locked and unlocked, together with the timing of the current through the magnetic coil.

The overall effect is very similar to that by which the Inchworm's familiar green namesake progresses along a tree branch, gripping the branch with its forefeet, hunching its body forward, then gripping with the hindfeet, hunching forward again, and so on. Unlike the green inchworm, the Inchworm can "crawl" backward as well as forward.

The gage feed control circuits, which average errors over several pieces, actuate a "correction" cycle when composite error signals exceed control limits. A step of large size is automatically provided in response to gross errors; gradual error trends result in smaller steps. Since delay time in averaging the size of several pieces is relatively large, the control system is stabilized to compensate only for slow rate variations such as grinding wheel wear, temperature changes, and trend variations in input size.

The complete automatic control system performs most of the observation, decision, and action functions that were previously performed by the grinder operator. He can now devote more of his skill to operations that require human judgment.

The Inchworm automatic control system has made it possible for Torrington to produce precision parts such as needle bearings, which have almost unlimited applications, to an accuracy that is consistently greater than ever before obtained (typically 0.00005″ or better.) According to John S. Miller, Superintendent of the Torrington Roller Plant, an improvement in size control has been achieved without any sacrifice in the speed at which parts are ground. In fact, the absence of rejections that used to occur has resulted in an increase in total output of usable parts. end

The 12 steps by which Chevrolet's transfer presses make a Level Air spring reservoir. It starts with a 13¼" dia blank, and ends with an irregularly shaped 6⅛" x 7" reservoir.

TRANSFER PRESSES IMPORTANT FOR MAKING AIR SPRINGS

NOT SINCE THE AUTOMATIC TRANSMISSION, says a Chevrolet spokesman in referring to air spring production, has a mechanical improvement created the need for so much newly designed equipment. Mammoth transfer presses have been playing a key role in their production of Level Air suspension units because they automatically shape stock with curvatures and depth of draw that would have been unbelievable a few years ago.

For example, in making one air spring part, a circular blank of sheet steel 11⅜" dia travels through six stamping operations in a transfer press. Each die in the press draws or extends a cylindrical hub a little deeper. At the conclusion of the cycle the hub measures 5" and the rim at the open end of the part measures 4". The draw has, in other words, "shrunk" the diameter of the blank two-thirds while extending its length beyond its width.

This part becomes the piston on which the rubber-capped reservoir rests in the car's suspension system. Resistance of the air inside the reservoir to the thrust of the piston supplies a cushion at each wheel of an air spring-equipped car.

Upper and lower control arms are also produced by Chevrolet's seven transfer presses, which range from 600 to 1,600 tons in pressure.

Although pistons and control arms are virtually ready for assembly in the car's suspension system at the end of the press cycle, reservoirs are subjected to subsequent processing. Front and rear reservoirs differ slightly, but the fabrication of a rear reservoir is typical: This part begins as a 13¼" dia sheet steel blank. As the metal progresses through a 13-step transfer press, it is formed into a container with a two-level top, a side valve entry, and a diameter of 6⅛".

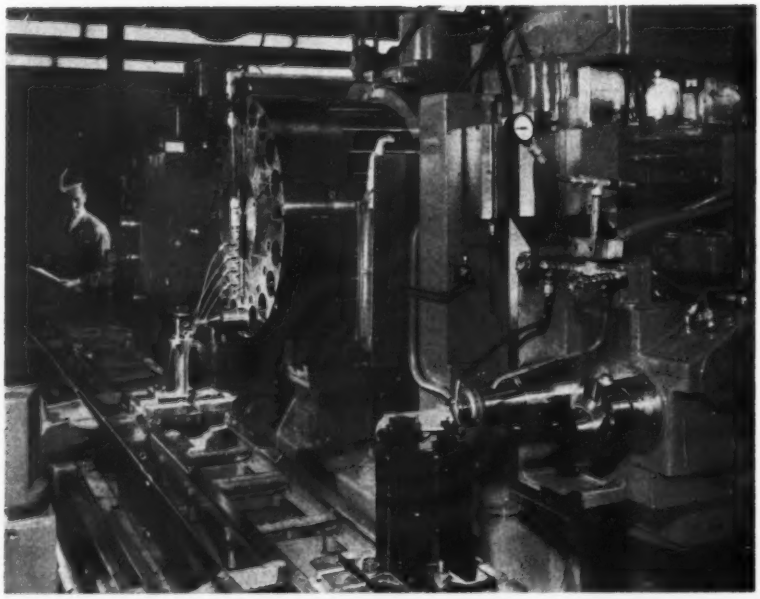
After welding on studs, the rim of the aperture is spot welded and brazed for the leveling valve adapter, and the interior of the reservoir is sprayed with an epoxy resin for rust-proofing. A 7⅜" rubber "doughnut" is then ringed to the open end and the interior valve assembly installed. The part is tested for leaks and the exterior painted automatically on spinning cams. A drying operation readies the spring for shipment.

end

This transfer press automatically and progressively shapes sheet steel into 6⅛" x 7" air spring reservoirs at Chevrolet's Livonia plant.

TAPE CONTROLLED MILLING, DRILLING AND BORING SPARKS JOB-LOT AUTOMATION

Hughes Aircraft and Kearney & Trecker have unwrapped a "fantabulous" three-machine line. Per punched tape instructions it will machine "one piece or a carload" of similar pieces, or will program a product mix of many different pieces.



The three-machine line of milling, drilling and boring units passes parts along (left to right) automatically after each machining operation. Mastermminded by the new Hughes Digitape electronic controls, this makes possible Detroit-type production techniques for small job lots. Machines are of modular construction thus making it easy to add, remove, replace and rearrange machines. Optimum speeds and feeds are automatically programmed by the control tapes.

Based on the "instructions" punched into the tapes, the "thinking" of the computer circuitry for the line can be monitored at this bank of relays and blinker lights. All information sent to the milling, drilling and boring machines becomes visual at these panels. The same job of monitoring could be done at a remote location by a closed circuit TV setup.

One of the module-type "flip-flop" circuits for the digital computer section of this first all-electronically controlled line of machine tools. Extensive use of printed circuits, transistors, and diodes saves space and, due to the compactness of the circuit assemblies, reduces maintenance costs.

Indicative of the flexibility and versatility of the Hughes Aircraft/Kearney & Trecker "tape-o-matic" (my word, EWP) line is this display of workpieces and their respective control tapes. In spite of the seeming intricacy and incompatibility of the workpiece shapes, the holding or transporting fixtures are of the simplest type — hence relatively low setup time.

This bar is the heart of Digitape's automatic work positioning. The light colored strip or path is actually a series of finely etched lines — 500 to the inch (0.002" increments). The small cylindrical magnetic pick-up head "counts" the lines, thus enabling the workpieces to be positioned relative to the cutting tools to an accuracy of 0.001".

The Digitape system allows engineering changes in product without need for retooling; only the tape is changed. Another plus is reduced spare parts inventory. When a spare part is needed, the tape for it is put on the reader and the part is produced in a matter of minutes.

At extreme right is master control panel which can start and stop tape readers, machines and transfers. Next to the left, four tape readers feed the tapes between contacts which are activated by the punched information. To left of tape readers are the control cabinets for the (right to far left) boring machine, drilling machine and milling machine. In the control cabinets the tapes' instructions are converted into workpiece movements and machine operations.

SPOTLIGHT ON PHILADELPHIA AND TOOLING FOR COMPETITION

IT TAKES BIG FIGURES to describe the coming American Society of Tool Engineers' Tool Show, and equally big pre-planning if Show visitors are to cover it adequately. More than 35,000 engineers, executives, and production men are expected to converge on Show grounds, Philadelphia's gigantic Convention Center and Philadelphia hotels, May 1-8 to see demonstrated some $10-million worth of modern production equipment and techniques and to hear top authorities from a wide range of industrial fields tell how to "Tool Up for Competition."

Making the Show and its related activities resemble a super-duper circus, complete with side shows, will be the Convention Center displays, the technical conferences — at which almost 100 papers are to be presented, the special symposiums on "Numerical Control" and "Tooling for Metal Powder Parts," the "Metal Cutting Seminar," and tours of 16 Philadelphia-area plants.

"The brightest lure that the Show and conferences can hold," says ASTE Executive Secretary Harry E. Conrad, the man behind the extravaganza, "is the availability of answers to the perennial question of how to produce more goods at lower cost." From the displays and the papers, he believes the Show visitor can strengthen his competitive position by learning how to use available equipment and processes most advantageously, and how to apply modern new ones.

A great number of new machines, tools, and processes will be unveiled at the Show. An entire hall of the Convention Center is to be reserved for precision gaging and inspection equipment, showing how to attain and maintain the high quality control accuracy needed to meet stiff competition. Throughout the other halls will be found the newest in metal cutting machines and tools for faster machining of both the standard materials and the relatively new "tougher" metals. Grinding and finishing equipment and supplies, presses, abrasives, cutting fluids — just about everything used in metal fabricating industries — will be displayed. An advance "tour" of the exhibits, highlighting the products to be displayed, is yours by turning through the following pages of this issue of TOOLING & PRODUCTION.

Topics for the technical conferences cover the entire field of manufacturing — from the first design of the production to its final inspection OK. Some of the more dramatic highlights will be the tooling behind guided missile production, automation for small plants, metal cutting research, use of diamond tools, fabri-

Technical Conferences

Thursday, May 1

Tool Engineering for Aircraft Production

"Magnesium in Aircraft Tooling," by Karl F. Melde, Boeing Airplane Co.

"A Tool Engineer's Approach to the B-58 Weapon System," by Ralph A. Fuhrer, Convair Div'n, General Dynamics Corp.

"Weight Savings in the Manufacture of Aircraft Engine and Missile Parts by Cold Roll Forming from Thick to Thin Material," by Arthur A. Merry and John G. Campbell, Pratt & Whitney Div'n, United Aircraft Corp.

"Safety Engineering as a Function of Human Engineering," by Max A. Pape, Missile Systems Div'n, Lockheed Aircraft Corp.; R. W. Faubion, North American Aviation; and Nikki Kaye, Kaye-Pape Associates.

Metal Cutting Review Seminar

Thursday and Friday
May 1 and 2

A comprehensive review of available basic information on metal cutting, arranged by James R. Matthew, Hughes Aircraft Co. Special preregistration required, as attendance will be limited.

Friday, May 2

Plastic Tooling

"For Tools and Dies — New Epoxy-Fiber Compositions," by A. P. Mazzuchelli, Bakelite Co., Union Carbide Corp.

"Our Experience in the Use of Plastic for Making of Duplicate Die Models, Engineering Checking Fixtures, and Prototype Tools," by A. E. Vallier and H. L. Wyatt, Ford Motor Co.

"Shell Molding and Tool Engineering," by Otto W. Winter, Shell Molding Div'n, Beardsley and Piper, Div'n of Pettibone Mulliken Corp.

Steel — Forgings and Extrusions

"Steel Forgings, Why and How," by A. O. Schaefer, Pencoyd Steel & Forge Corp.

"Design Features and Cost Benefits of Hot Extruded and Cold Drawn Steel," by R. L. Hugo, Jones & Laughlin Steel Corp.

Nuclear Engineering

"Standardization in the Nuclear Industry," by Dr. Henry H. Hausner, Penn-Texas Corp.

"Unique Aspects of Nuclear Component Manufacture," by H. C. Amtsberg, Westinghouse Electric Corp.

Cutting Tools

"Tool Steel Toughness — Rated by a New Method of Measurement," by Gary Steven, A. E. Nehrenberg, and V. D. Chandhok, Crucible Steel Co. of America.

"Basic Developments in Carbide Tooling," by W. L. Kennicott, Kennametal, Inc.

Ceramic Tools

"New Developments in High Velocity Machining," by Wallace B. Kennedy, Rodman Laboratory, Watertown Arsenal.

"Characteristics and Experimental Performance of Certain New Ceramic Tool Compositions," by A. G. King, and W. M. Wheildon, Norton Co.

Tool Engineering Research I

"Role of Research and Development in Gear and Spline Production Equipment," by Richard S. Hildreth, Michigan Tool Co.

"Research Report on High-Speed Circular Sawing of Aluminum Alloys," by O. H. Nuss, DeWalt Div'n, American Machine & Foundry Co.

Saturday, May 3

General Tool Engineering I

"Static Switching for the Mechanical Engineer," by Arthur H. Wolfson, Gage Div'n, Pratt & Whitney, Inc.

"Vitrifiable Silicate Tooling for High Temperature Plastics," by J. D. Stillman, Convair Div'n, General Dynamics Corp.

Metal-Cutting Research I

"Mechanism of Chip Formation in Metal-Cutting," and "Some Thermal and Physical Aspects of Metal-Cutting," by Dr. Donald N. Gideon, Dr. Ralph Simon, and Dr. Horace J. Grover, Battelle Memorial Institute.

cation of titanium, and European tool engineering. All told, practically all of the "stiff competition" technical developments that plants are facing will be covered by at least one paper. A complete listing of technical papers and authors begins on this page.

Metal cutting authorities point out that if improvement in machining methods could save only 10% of the 15-million-plus tons of metal whittled away each year into chips, it would add more than a billion dollars to the American economy. The Tool Show's special-registration, two-day Metal Cutting Seminar doesn't guarantee each attendee will save any set percentage of that billion dollars, but it will concentrate on the integration of known metal cutting data and applications in an effort to show where and how to cut machining requirements and costs.

An added attraction for Show visitors is the line-up of 16 plants — some in allied fields, some in interesting but remotely connected fields — open for tours. Thirty inspection visits are lined up. Plants include The Budd Company; Campbell Soup Company; Cuneo Eastern Press, Inc.; Curtis Publishing Company; Fischer & Porter Company; I-T-E Circuit Breaker Company; Leeds & Northrup Company; Link-Belt Company; Minneapolis-Honeywell Regulator Company's Brown Instrument Division; Chrysler Corporation's Plymouth Division; Schramm, Inc.; Simonds Abrasive Company; Standard Pressed Steel Company; The United Naval Base — Philadelphia Naval Shipyard; United States Steel Corporation; and the Yale & Towne Manufacturing Company. Special activities of a few of these plants are spotlighted in the following pages of this issue of TOOLING & PRODUCTION.

Surface Finishes

"Gear Tooth Honing — a New Approach to Improving Gear Surface Finish," by B. F. Bregi, National Broach & Machine Co.

"Obtaining Specified Finishes by Honing," by B. R. McConnell, Sr., Sunnen Products Co.

Metal-Cutting Research II

"Present Knowledge of Cutting Fluids," by S. L. Cosgrove and Roy W. Greenlee, Battelle Memorial Institute.

"Influence of Metallurgical Properties on Metal-Cutting Operations," by Francis W. Boulger, Battelle Memorial Institute.

General Tool Engineering II

"New Manufacturing Techniques for Hydraulic Servo Valves," by Edgar M. Hakanson, Machine Tool Div'n, Sheffield Corp.

"The Use of Ultrahigh-Speed 150-hp Lathe for Machinability Studies," by H. J. Siekmann, Metallurgical Products Dep't, General Electric Co.

Metal Cutting Research
A Panel Discussion

Saturday, May 3

Papers presented by Prof. L. V. Colwell, University of Michigan; E. L. Fowler, International Nickel Co., Inc.; R. E. McKee, R. K. LeBlond Machine Tool Co.; Prof. Kenneth J. Trigger, University of Illinois; and Norman Zlatin, Metcut Research Associates.

Monday, May 5

Tool Engineering Research II

"A New Approach to Some Relationships in the Theory of Metal Cutting," by Dr. Max Kronenberg.

"Machine Tool Dynamometers, Their Design and Application," by Erik K. Henriksen, Convair Div'n, General Dynamics Corp.

Guided Missile Special

Monday, May 5

"A Production Engineer Looks at Missile Design," by F. R. Swaney, Missile Operations, Chrysler Corp.

"A Missile Designer Looks at Production," by Emil A. H. Hellebrand, Army Ballistic Missile Agency.

General Tool Engineering III

"Automatic Size Control for Centerless Grinders," by Arthur Parnes, Airborne Instruments Laboratory, Inc.

"The Significance of the Surface Finish Produced by Electro-Discharge Machining," by Charles H. Good, Micrometrical Development Corp.

Diamond Tools I

"Oriented Diamonds in Connection with Single-Point Tool Applications," by J. B. Spiers, American Coldset Corp.

"Proper Grain Orientation Improves Diamond Cutting Tool Life," by Jan Taeyaerts, Precision Diamond Tool Co.

Numerical Control Symposium

Monday May 5

"Numerical Control: Facts and Fallacies," by T. W. Black, The Tool Engineer.

"Numerical Control," by R. V. Benaglio, Research Laboratories Div'n, Bendix Aviation Corp.

"Machine Tool as the Controlled Element," by J. R. Ballinger, Research Laboratories Div'n, Bendix Aviation Corp.

"Potential of Numerical Control Manufacturing Operations," by L. S. Peck, Autonetics Div'n, North American Aviation, Inc.

Tuesday, May 6

"Numerical Control for Templates and Dies," by Dr. Darwin H. Bingham, Jr., Numerical Control Programming Section, Giddings & Lewis Machine Tool Co.

"Production Experience on Numerically Controlled Machine Tools," by F. Booth, Research Laboratories Div'n, Bendix Aviation Corp.

"Contouring Control from Numerical Data," by John W. Wilson, Development Research Dep't, Cincinnati Milling Machine Co.

"The Tool Engineer and Tape Preparation," by H. H. Schatz, Research Laboratories Div'n, Bendix Aviation Corp.

"Numerical Control — First Year Statistics," by Bernerd Gaiennie, Northrup Aircraft, Inc.

"Programming for Numerical Control," by Carl B. Perry, Douglas Aircraft Co., Inc.

Tuesday, May 6

Diamond Tools II

"Oriented Diamonds Give Maximum Performance in Formed Dressing Tools," by Joseph Klipper, Clipper Diamond Tool Co., Inc.

"The Oriented Vector in Diamond Dressing Tools," by Harold C. Miller, Supercut, Inc.

New Drilling Techniques

"The Spiral Point Drill — A Self-Centering Drill Point Geometry," by Hans Ernst and W. A. Haggerty, Cincinnati Milling Machine Co.

"Production Drilling and Reaming of Precision Holes With Gun-Type Tools," by Herbert Gregg, Star Cutter Co.

Powdered Metal Symposium

Tuesday May 6

"The Effects of Structural Part Design on Tooling for Sintered Metals Fabrication," by Frank J. Demaine, Sintered Metal Lab, International Business Machine Corp.

"Process Selection and Economics," by Prof. Gregory J. Comstock, Powder Metallurgy Lab, Stevens Institute of Technology.

"Presses for Powder Metallurgy," by James J. Kux, Kux Machine Co.

"Briquetting Tools," by Robert A. Koehler, Powder Metal Div'n, and J. N. Smith, Powdered Metal Tools, National Cash Register Co.

"Metal Powders and the Tool Engineer," by William L. Batten, Powder Metallurgy Dep't, Vanadium Alloys Steel Co.

"Sintering Structural Parts," by John H. Speck, Amplex Div'n, Chrysler Corp.

"Finishing Operations," by Peter E. Young, Scientific Lab., Ford Motor Co.

Diamond Tools III

"A Rapid Method for Setting Oriented Diamonds in Tools," by R. G. Weavind, C. J. Guykers, and A. R. Roy, Crown Mines.

"The Orientation of Diamonds for Tools by Means of an X-Ray Image Intensifier Tube," by Dr. J. F. H. Custers, Diamond Research Laboratory, Crown Mines.

European Tool Engineering

"Recent European Metal-Cutting Investigations," by Professor Milton C. Shaw, Massachusetts Institute of Technology.

"Tool Engineering in Europe," by J. W. Greve, The Tool Engineer.

Wednesday, May 7

Automation I

"Machinery and Automation," by J. C. Keebler, Automation.

"Automation — The Manufacturing, Sales, Engineering Triangle," by William C. Allen, Westinghouse Electric Corp.

Titanium

"On Machining Titanium," by G. W. Bauer, Mallory Sharon Titanium Corp.

"Design Considerations for Cold Extrusion of Titanium," by Alvin M. Sabroff, Rocco A. Sannicandro, and Paul D. Frost, Battelle Memorial Institute.

Cutting Tool Material II

"Cutting Tool Materials of the Future," by William Reich, Advance Engineering, Metallurgical Products Dep't, General Electric Corp.

"Today's Cutting Tool Materials," by George A. Roberts, Vanadium-Alloys Steel Co.

Automation II

"Types of Automatic Assembly Equipment," by Lloyd L. Lee, LeMaire Tool & Mfg. Co.

"Automatic Manufacturing with the Integrated Line," by Don A. Cargill, Cargill Detroit Corp.

General Tool Engineering IV

"Gaging Screw Threads for Acceptability," by Eric G. Gabbey, O-Vee Gauge Co.

"Frictional Behavior of Metals and Plastics," by Dr. A. O. Schmidt, Kearney & Trecker Corp.; and Elmer J. Weiter, Marquette University.

Creative Standardization

A Panel Discussion by Dr. Allen V. Astin, National Bureau of Standards; W. D. Budge, Westinghouse Electric Corp.; Roy Trowbridge, General Motors Corp.; and Leo B. Moore, Massachusetts Institute of Technology.

Thursday, May 8

Automation III

"High Production Automation Through Low-Speed Mechanisms," by Julian Wille, Motorola, Inc.

"Application of Weldamation Techniques to Welding Processes," by John G. Brems, Welding Machine Div'n, Expert Die & Tool Co., Inc.

General Tool Engineering V

"Capacity of Lathe Chucks," by E. J. Weller, General Electric Company.

"What Will Mechanical Tool Holders Do For You?" by Harold E. York, Metallurgical Products Dep't, General Electric Co.

"Economic Advantages of Progressive Dies," by George E. Gault, Ehrhardt Tool & Machine Co.

Automation IV

"Simplified Setups for Job Shop Automation," by Raymond Sollohub, and Robert Coen, General Electric Co.

"Automated Special Machines for Low Production Parts," by Howard N. Maynard, Snyder Tool & Engineering Co.

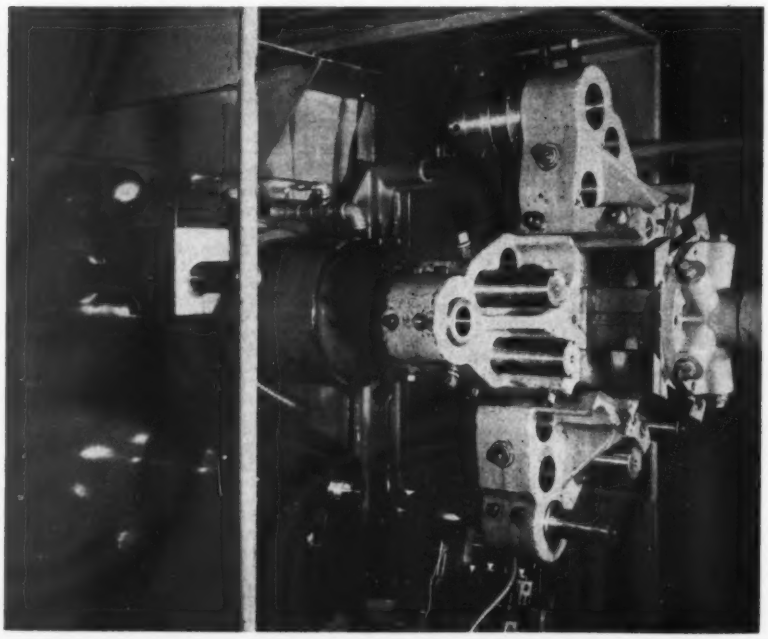
"Can the Small Plant Afford Automation?" by Ralph Eshelman, The Iron Age.

"Automation as Applied to Small Lot Production," by Werner O. Miller, Textile Machine Works.

WHAT'S HAPPENING IN PHILLIE PLANTS?

At Fischer & Porter
It's Easier to do Small Lots on Automatics

AUTOMATIC PRODUCTION OF 25-piece lots, highly desirable to the small and medium size manufacturer, is realistic with modern equipment, says Fischer & Porter Company's chief production engineer, Robert Sanders. The company's diversity and need for various numbers of products, he adds, makes it necessary for them to find methods to produce small quantities of complicated machined parts economically.



Warner & Swasey automatic chucker tooled up for production of turbine meter part.

A Warner & Swasey automatic chucker is being used there to produce many parts previously machined on turret lathes. Its ease of setup, flexibility, and ability to hold close tolerances are the plus-factors which led Fischer & Porter to switch from turret lathes.

In machining parts for turbine meters and differential pressure transmitters, below is the company's comparison record.

The majority of the parts are slugged; the remainder are castings and second operations off automatic

Material: 316 Stainless Steel

Quantity: 30-60 pcs

Old Time: 1.5 hrs (Using Lathe)

New Time: .64 hrs (Using Chucker)

% Savings: 57%

bar machines. The part shown is the body of a high pressure turbine flow meter. It requires special Class 3 AN threaded connectors, 32 microinch finish, and close tolerances, and takes two operations to complete a part, including machining of a finished bore.

The first operation includes turning the OD and spot drilling, facing, drilling a hole approximately 3" deep, chamfering a hex and rough machining a 37° angle seal, machining undercuts, finishing the 37° angle seal, and chasing the threads. The second operation is similar, except for the addition of rough and final finishing of the bore.

The major contributing factors to Fischer & Porter's success in small lot production, says Mr. Sanders, have been the facts that chucker setup time is only slightly more than that of a turret lathe, and that most of the products require the tougher machining stainless steels which necessitate long cycle times. This permits the operator to perform other machining operations on similar equipment simultaneously.

Yale & Towne Finds Extra Uses and Results with Standard High Speed Machines

A LITTLE EXPERIMENTING has resulted in much faster production of many more different pieces, using a Michigan Shear Speed gear shaper and two Ultra Speed hobbing machines at the Philadelphia Materials Handling Division of the Yale & Towne Manufacturing Company. Along with production times and rates, Yale & Towne engineers also note an improved quality of the gear, sprocket, and ratchet teeth.

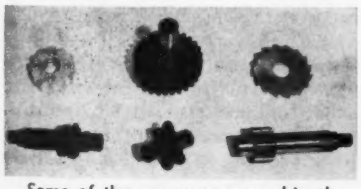
Although the Shear Speed gear shaper is generally considered to be adaptable only to very large runs of an individual gear, Yale & Towne engineers have put it into service cutting gears on shorter runs of 32 different parts with marked operating economies.

Whereas 14 hrs/100 pcs was considered average production time for gear cutting on many of the parts, with the Shear Speed machine these times have been cut as low as 3 hrs/100 pcs.

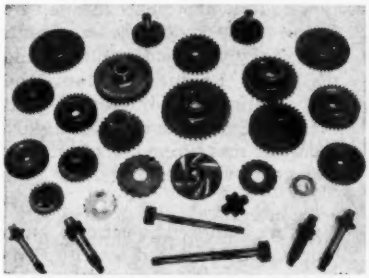
In addition to the faster operating benefits, Yale & Towne tool engineers find that this machine produces a very smooth finish. The feed, actuated by a cam, averages 0.005"/stroke. Starting strokes exceed this average, permitting smaller depths/stroke for semifinishing, and two dwell strokes for final finish.

The standard 7" Shear Speed machine has a removable 5" reducing liner in the head, and a capacity of 1.312" to 7.250" pitch diameter.

Setup time averages about 4.7 hrs for a complete changeover including reducing liner, head, fixture, and blades. This time also includes checking the first piece for over-pin dimensions, concentricity, parallelism, etc., and making any necessary adjustments. The shortest changeover time achieved is 3½ hrs.

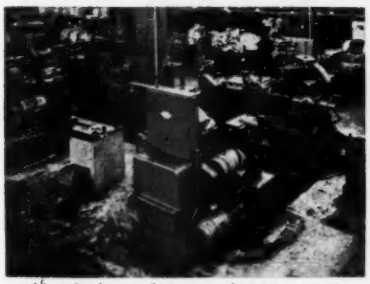


Some of the many gears machined on the Shear Speed gear shaper.



Some of the gears on which teeth are cut on an Ultra Speed hobbing machine.

Production rate increases as great as 450% have been accomplished with the Ultra Speed hobbing machines. At Yale & Towne, the hobs are run at 200 sfpm, using climb hobbing with 0.060" to 0.080 ipr feed on most parts. Excellent results are achieved at these speeds and feeds on SAE 4815 steel.



Here's how the gear hobbers and gear shaper are located at the Yale & Towne Philadelphia plant.

The machines were installed with tooling for 54 different parts. Only minor changes were needed in this tooling to raise the production potential to 105 individual parts. The parts range from 0.786 to 8.875" dia and from 4 to 16 pitch.

Operating at the 200 sfpm, the hobs cut twice as many pieces per grind as previous methods used and require less than one-third as much material be removed to resharpen. The result is a considerable saving in hob costs since Yale & Towne now gets six times as many gears per hob as under previous methods.

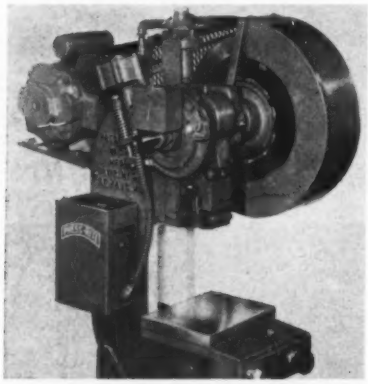
Production Checking a 'Must' at SPS

STUDS UP TO 6" dia and 72" long are produced by Standard Pressed Steel Company's Stud Division, many of them involving complicated special machining, complex configuration, and custom heat treating. Quality control, particularly when studs are destined for high-precision, high-pressure applications, begins with incoming material. A very important phase, however, is the production checking.

Studs are systematically checked throughout production by a battery of gages including optical comparators, super-micrometers, ring gages, and dial-indicating micrometers. A great deal of responsibility for quality is placed on the machine operator, who is provided with complete gaging facilities at his machine, and who checks workpieces throughout his particular operation. His continuing inspection is backed up by periodic Q-C Department inspections, and the SPS Thread Metrology Lab.

TOOL SHOW PREVIEWS

- A new deep throat OBI power press and the No. 0 5-ton press equipped with Airflex air clutch



providing a top speed of 450 sfpm, will be featured at the display of Press-Rite Div'n, Sales Service Machine Tool Co. at Booth 2035. (S1)

- Thirty thousand different sizes of drill jig bushings will be exhibited in Booth 2052 by Ace Drill Bushing Co., Inc. The full range of sizes covers all uses, whether for steel, or for use in castable or non-ferrous materials, plastic, or wood. (S2)

- An expanded line of Em-re dial indicators will be shown at Booth 435 by Petz-Emery, Inc. The accuracy, durability, and repeatability of these indicators will be demonstrated. Included will be 93 dial indicator models in four A.G.D. ranges. (S3)

- The Miller Fluid Power Div'n, Flick-Reedy Corp. will feature its recently introduced All Teflon seal cylinder at Booth 1625. Pressure ratings have been heightened on the Power-Packed cylinders and new Job-Rated cylinders have medium to high presure. (S4)

- Among the tools to be exhibited for the first time by Karl A. Neise will be a quick change toolholder for lathes, which enables cutters to be pre-set in their respective holders with ease in a short time. Mermond master step blocks, Master milling cutters, and Ringspann discs will also be displayed at Booth 1857. (S5)

- Visitors will view the complete line of Unbrako self-locking socket screws produced by Standard Pressed Steel Co. At Booth 322 you will see how the Nylok insert makes the screw stay tight under severe shock and vibration. (S6)

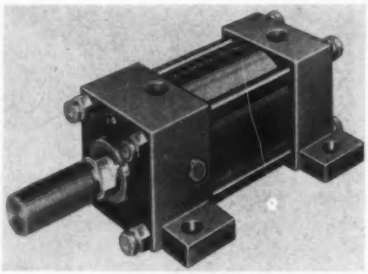
- Information on the Blake tap flute grinder will be presented by The Edward Blake Co., Inc. This machine saves money in tap costs and makes uniformly tapped holes. The Blake tap chamfer grinder will also be at Booth 1646. (S7)

- A new model Wilder Micro-Projector will represent one in a line of optical measuring and inspection equipment to be exhibited by Opto-Metric Tools, Inc. at Booth 101. They will also display a line of Frank hardness testers, the Leitz optical dividing head, and the Leitz Perflectometer for highly accurate measurement of master ring gages and similar bores. (S8)

- Working and inspection gage blocks manufactured by The Fonda Gage Co. will be on display at Booth 2119. Both square and rectangular blocks, and accessories in steel and tungsten carbide will be shown. (S9)

- Information on the Tri-O-Set dial bore gage kit and granite surface plates may be obtained at Booth 234. Both items are new from Boice Gages, Inc. The new bore gage, the 2/0, with the use of 4 extensions, covers a range of 0.084" to 0.125". (S10)

- The Logansport Machine Co., Inc. will introduce its new line of Series 50,000 air cylinders at Booth 1652. This line features



steel cylinder heads and mountings, precision honed cylinder tubes, cartridge type rod bearing and packing assembly, and heavy-duty piston rod. (S11)

- Visitors at Booth 2008 will see the new automatic drilling unit manufactured by Bedford Gear and Machine Products, Inc. It can be

used for semi or fully automatic operations, and is adaptable to multiple drilling and reaming. (S12)

- The new Bore-O-Scope, an optical inspection instrument for examination of hidden surfaces, is the principal product to be exhibited by Size Control Co. In addition, various types of gages, gear and thread measuring wires, bore master rings, and master discs will be on display in Booth 405. (S13)

- The display at Booth 946 for The Standard Electrical Tool Co. will be devoted to the complete line of super precision spindles for routing, milling, grinding, boring, and drilling. Slides and feeds will also be included. (S14)

- The Jektole piercing punch with companion insert die will be exhibited for the first time by Dayton Perforators, Inc. at Booth 2106. Unique features of the device permit increased production, lower tooling costs, and faster punch sharpening when needed. Other precision tools for production piercing will be on display. (S15)

- On display at Booth 136 will be the No. 14 optical comparator manufactured by Covel Mfg. Co. This machine, a complete checking unit, permits quick, economical, precision inspection in the shop. The stage has a 13" x 6" working area, and 6" horizontal, and 2¼" vertical movements. (S16)

- Three new heat treated hss taper length drill sets will be featured at Booth 432 by Ace Drill Corp. These sets include taper length drills in fractional, wire, and letter sizes packaged in metal index cases. The Halfpak fractional size set contains 29 taper length drills, ranging from 1/13" through ½" dia by 64ths. (S17)

Not Attending? For additional data on any of these products, Circle Key No. (in parentheses) on Inform-A-Gram Card, page 166.1

TOOL SHOW PREVIEWS

- Hardsteel tools will take deeper cuts at higher speeds with heavier feeds, removing more metal with less cratering. These tools are made from an alloy containing complex oxide additives which impart to the metal higher tensile strength and toughness, higher red hardness, maintained edge strength, and low coefficient of friction. Black Drill Co., Inc. will show Hardsteel tools at Booth 1051. (S18)

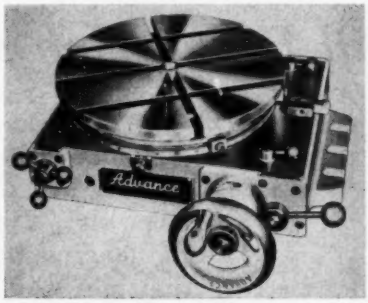
- A standard air-powered package unit that unloads sheet metal panels or forgings from presses in a straight line, will be the main feature of the exhibit of the Press Automation Systems, Inc. Also on display at Booth 1256 will be a complete assortment of mechanical jaw assemblies for straight-line or swinging-arm types of press unloaders. (S19)

- Products to be shown by The Cushman Chuck Co. include a line of manually- and air-operated chucks, power wrenches, and power wrench chucks. Featured at Booth 1439 will be automatic pinch jaws for use on face plates, milling machine or jig boring machine tables; two jaw indexing chucks; and a high speed aluminum body air cylinder. (S20)

- Cleveland Instrument Co., Inc. will introduce the Ex-Ac work position locator, Indi-Ron high precision roundness gage, and a roughness meter at Booth 953. An electronic

height gage, a production gage, and the Indi-Ac portable dimensional gage and comparator (illustrated) will also be shown. (S21)

- Of special interest at Booth 2111 will be the improved cross-slide rotary table (illustrated) which eliminates the need for moving



and relocating for different operations. Advance Products Corp. will also show a milling machine "T" square for positioning work on milling machine tables. (S22)

- The Valenite Metals display at Booth 644 will be devoted to throwaway insert tooling. In addition to the line of throwaway holders, the company will present ideas in the application of throwaway tooling in special purpose tools. Operations covered will be milling, boring, trepanning, and facing. (S23)

- A new line of general purpose turning heads, equipped with patented Micrometer Vernier Toolpoint adjustment, will be featured at Booth 1549 by DeVlieg Microbore, Div'n of DeVlieg Machine Co. They are designed to perform a variety of turning operations from the turret of all makes and types of horizontal turret lathes. (S24)

- A line of electrolytic oscillating chip breaker and cup wheel grinders will be on display at Booth 1704. Hammond Machinery Builders Inc. will have a line of machines in operation. They include the SCE-10 Duplex Oscillator, Model CME-6 double end chip breaker and cup wheel grinder for carbide tools. (S25)

- To be featured at Booth 1435 will be precision machining of AISI 52100 steel using Carboloy grade 0-30 cemented oxide. General Electric's Metallurgical Products Dept. will machine the steel at 600 sfpm and show how fine surface finish can be obtained with 0-30 oxide. (S26)

- New instruments and methods for checking the accuracy of basic inspection equipment will be demonstrated at Booth 403 by Rahn Granite Surface Plate Co. Two Planekators for calibrating worn surface plates will be demonstrated: one to prove the accuracy of a large Rahn laboratory grade surface plate, and the other to show the calibration of a worn surface plate. (S27)

- A display of Stupalox oxide cutting tool materials will be featured by the Stupalox Div'n of The Carborundum Co. at Booth 709. Stupalox oxide cutting tools, made of sintered aluminum oxide cutting tool materials, which are hard, tough and wear resistant, will be seen in action. Also to be shown are Stupalox toolholders, rugged and precision made with serrated adjustable chipbreaker clamps. (S28)

- Featured at Booth 1317 will be two new bending machines. The Model 6-T tube bending press and the Model 3T, designed for high speed progressive bending, will be demonstrated by Pines Engineering Co. (S29)

- A line of standard stock round broaches is to be exhibited by The duMont Corp. To be seen at Booth 139, these pushtype Minute Man broaches finish to exact size in one pass, and are available in 13 sizes. (S30)

- A bench comparator with new low-cost accessories will be shown by The Bausch & Lomb Optical Co. at Booth 119. Of special interest will be two major accessories, a surface illuminator and protractor ring. (S31)

- Vascoloy-Ramet Corp. will introduce two new steel-cutting grades of carbide. Visitors at Booth 1035 will see V-R 73 and V-R 77 throw-

away inserts, standard blanks, and standard brazed tools, in addition to a new line of fixed-base tool holders (illustrated). (S32)

Not Attending? For additional data on any of these products, Circle Key No. (in parentheses) on Inform-A-Gram Card, page 166.1

Bill Pennington sez:

One day as I sat musing, sad and lonely, without a friend, a voice came to me from out of the gloom, saying, "Cheer up! Things could be worse!" So I cheered up, and sure enough! Things got worse!

Enough of that foolishness! There's nothing "worse" about our upcoming issue of TOOLING & PRODUCTION!

A lot of water has gone over a lot of dams since 1948 when we published our first annual Quality Control feature issue.

Holding to tradition, next month's (May 1958) TOOLING & PRODUCTION will offer much to satiate the Quality Control appetite of many readers. Here's a sample menu:

"Do You Know Your Machine Capabilities?" If not, Ralph Nottingham and A. R. Thompson of Brush Electronics provide the know-how and show-how, with an extra dividend in the form of a machine capability worksheet that streamlines all the work.

Milton E. Ellis of Brown & Sharpe Mfg. Co. presents a round-up of "The Fascination of Precision" which includes some historical background mixed with practical workaday procedures for getting the most out of your Jo-Blocks.

Cliff Kennedy of Federal Products is authoring a valuable contribution to the problems (and answers) involving automatic inspection. His "Embodiment of SQC in Automatic 100% Inspection" tells how to feed the output of like pieces from several machines to a centralized inspection station. This will check three significant dimensions, and reject out-of-tolerance pieces in terms of the originating machine. This also involves the workings of Statistical Quality Control.

How flat is a flat surface plate? If it isn't — you have to know it before you get in hot water. The accurate calibration of a surface plate in terms of its "hills and valleys" is readily accomplished by following the step-by-step instructions given by R. J. Rahn of the Rahn Granite Surface Plate Co. His "Planekator" procedure will enable you to draw a "topographical map" of your surface plates — large or small.

Also, next month, for those whose "take home" does not depend on wrestling with X-bar charts and measuring tools, we will throw in such pot sweeteners as "Maintenance Training for Numerical Control Equipment"; "Salvaging Waste Sheet Metal Pieces" from press operations; safe torqueing for grinding wheel mounts.

All this — PLUS — the kick-off for Associate Editor Hoffman's "Machine & Tool Design Clinic" which will offer the rights and wrongs of design concepts, and which will challenge your own thinking.

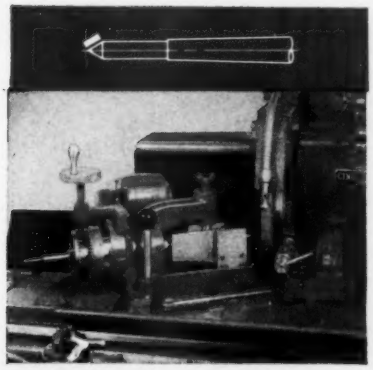
Quite a dish, what? Sure looks as though your next TOOLING & PRODUCTION will be Queen of the May — issues! Welcome aboard!

Here's the Point

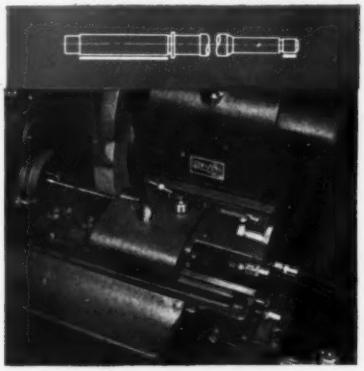
... your high precision work, from the point on a textile machine part to small armature shafts, get the most economical grind on CINCINNATI FILMATIC 4" Plain Hydraulic Grinders. May we tell you more? Write for Catalog No. G-551-5.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

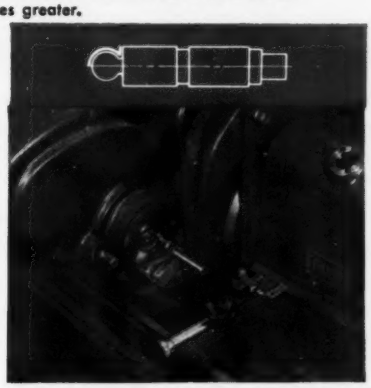
Master roller gages are ground to accuracies of 10 millionths in roundness and size on the CINCINNATI FILMATIC 4" Plain illustrated here. Surface finish within 2 micro-inches. Of course this machine is equipped with a number of extra features to enable it to produce ultra-precision work of this type. Compared to the previous machine and method, tolerances have been cut in half and production is about seven times greater.



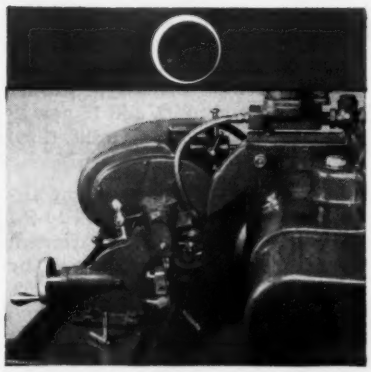
Center angle and point radius are ground concentric with bearing diameters on textile machine parts. Conventional swivel table, headstock and footstock have been omitted and replaced by a special fixture.



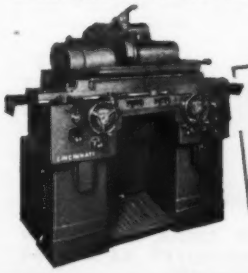
Two diameters are precision ground on armature shafts in two setups, at the rate of 200 per hour per diameter. To reduce operator fatigue while maintaining a high rate of production, the CINCINNATI FILMATIC 4" Plain Hydraulic Grinder for this job is equipped with automatic infeed, hydraulic footstock and work cradles.



Ball end and shoulder are ground in one chucking on a CINCINNATI FILMATIC 4" Plain Hydraulic Grinder. Unique tooling for this job includes combination radius and angular truing attachment, and table with an angular bearing section for live spindle headstock featuring a lever operated draw-in collet attachment.



.048" eccentric diameter ground from the solid. The CINCINNATI FILMATIC 4" Plain Hydraulic Grinder at the left easily handles this heavy stock removal job. Equipment is practically standard with the exception of the work holding fixture and a special table type truing attachment.



CINCINNATI FILMATIC 4" PLAIN HYDRAULIC GRINDING MACHINE
Catalog No. G-551-5.
Brief Specifications in Sweet's Machine Tool File

CINCINNATI FILMATIC

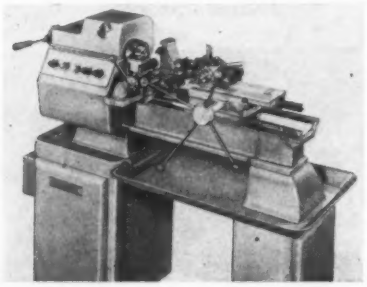
CINCINNATI®

CENTERTYPE GRINDING MACHINES • MICRO-CENTRIC GRINDING MACHINES
CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE
GRINDING MACHINES • CHUCKING GRINDERS • CENTERLESS LAPPING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 103

TOOL SHOW PREVIEWS

• Sheldon Machine Co., Inc. will demonstrate three new machine tools at Booth 724. The ZWM-46-P high-speed second operation hand turret lathe features push-button variable speed drive with



spindle speeds from 40 to 2000 rpm. The other new items, a hydraulic tracer lathe and a precision No. 0 milling machine, will be shown in addition to other lathes in the Sheldon line. (S33)

• A total of 134 new cutters will be introduced by the Cutting Tool Division of The Brown & Sharpe Mfg. Co. Displayed at Booth 122 will be 60° angular cutters, square end (single- and double-end) end mills, 14 new shank-type corner rounding end mills, and 15 new 2-flute straight-flute end mills. (S34)

• A new Model 77 self-centering air-hydraulic vise and a Model 10-SQ Squarite shaper vise attachment will be shown for the first time by Heinrich Tools Inc. at Booth 1252. The Model 77 with 7" jaws and maximum opening of 7", is designed for automatically centering and holding parts varying in size or shape. (S35)

• Five different models of the Nichols precision milling machines will be exhibited by the W. H. Nichols Co. in cooperation with the Robert E. Morris Co. Main attractions at Booth 501 will be the latest model of the Twin Mill and new model tool room miller with rise and fall spindle head. (S36)

• The Gardner-Denver exhibit will include a line of air tools made by the firm's Keller Tool Div'n. They include tools for multiple drilling; hand held tools, such as ratchet wrenches and nut setters; and air hoists. They will be seen at Booth 1930. (S37)

• At Booth 837 The Noble & Westbrook Mfg. Co. will feature the Series 50, Model 50PL roll marking machine which marks round or flat workpieces with equal facility. They also plan to exhibit a rapid production dial-type marking machine. (S38)

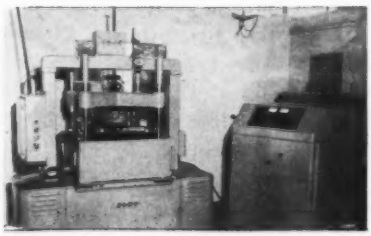
• In Booth 1662 Howe & Fant will demonstrate the turret drilling technique for handling short- and intermediate-run drilling and tapping operations. They will show the Model A, which has a capacity of ½" in steel; and Model B, having a 1" capacity. (S39)

• Highlighting the display of The Graymills Corp. will be new mist coolant pumps and systems, as well as a completely new line of high head centrifugal pumps. A line of parts washers for cleaning tools, dies, and individual metal parts will also be seen at Booth 1214. (S40)

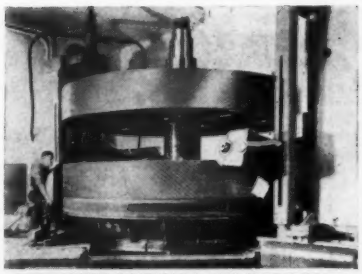
• A line of millers and shapers will be displayed by Austin Industrial Corp. Of interest are two plain horizontal millers; a horizontal universal miller; and vertical miller shapers with 14", 22", and 26" strokes; and a vertical shaper with 5" stroke. (S41)

• An expanded line of precision slide assemblies will be the subject of the display at Booth 1016. Included will be a variety of standard stock components for building up special machines and production equipment manufactured by Russel T. Gilman, Inc. Light- and heavy-duty slide assemblies will be shown. (S42)

• Elox Corporation of Michigan will announce a new machine tool for electrical discharge machining of cavity type dies at Booth 935. Three sizes are available for machining dies up to 23" high and



44" long. With them, dies can be heat-treated before machining because the hardness of the metal does not affect the cutting action. (S43)



MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES

The American Laundry Machinery Co., Rochester, N. Y.
Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
E. W. Bliss Co., Canton and Toledo, Ohio and Hastings, Mich.
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Compton Foundry, Compton, Calif.
Continental Gin Co., Birmingham, Ala.
The Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co., Portland, Ore.
Empire Pattern & Foundry Co., Tulsa, Okla. and Bonham, Texas
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg. Co., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundries, Inc., Chicago, Ill.
The Hamilton Foundry & Machine Co., Hamilton, Ohio
Hardinge Company, Inc., New York, N. Y.
Hardinge Manufacturing Co., York, Pa.
Johnstone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Koehring Co., Milwaukee, Wis.
Lincoln Foundry Corp., Los Angeles, Calif.
Nordberg Manufacturing Co., Milwaukee, Wis. and St. Louis, Mo.
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
The Prescott Co., Menominee, Mich.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sonith Industries, Inc., Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Valley Iron Works, Inc., St. Paul, Minn.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario

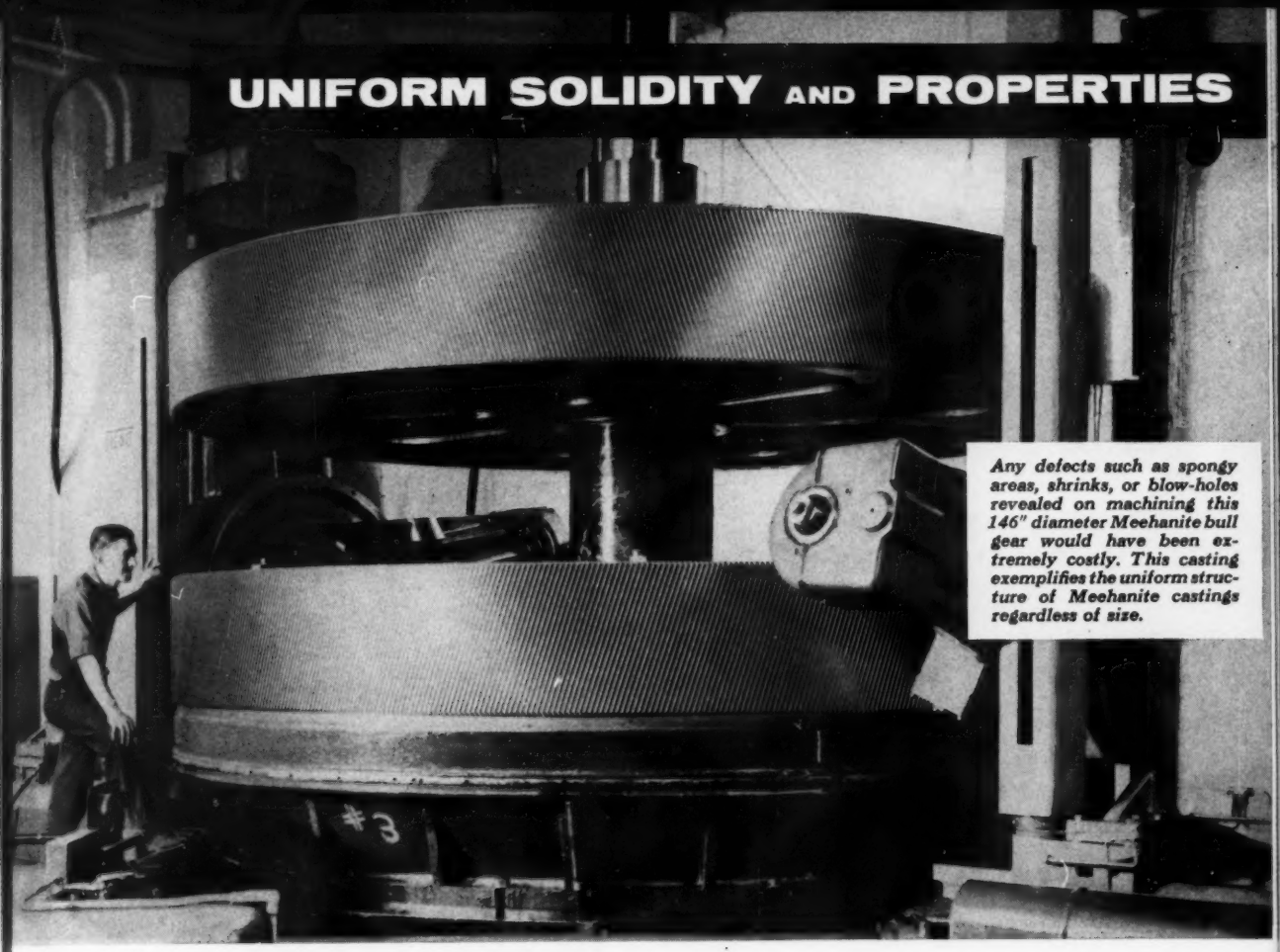
WRITE TODAY FOR YOUR FREE SINGLE COPY OF BULLETIN NO. 42

34 PAGES OF USEFUL INFORMATION ABOUT MEEHANITE® AS A GEAR MATERIAL

Write today to Meehanite Metal Corporation, Department 8H 714 North Avenue, New Rochelle, New York.

MEEHANITE®

UNIFORM SOLIDITY AND PROPERTIES



Any defects such as spongy areas, shrinks, or blow-holes revealed on machining this 146" diameter Meehanite bull gear would have been extremely costly. This casting exemplifies the uniform structure of Meehanite castings regardless of size.

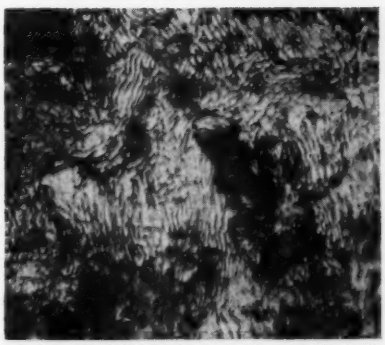
Uniformly sound Meehanite gears offer high strength, wear resistance and free machinability.

Meehanite metal is one of the most valuable gear materials produced and has replaced steel in many different types of gear applications. It combines the most desirable characteristics of both mild steel and gray iron and wears longer.

Gears made in Meehanite® have uniform physical properties and a fine grain, dense structure free from hidden weaknesses which might lead to premature tooth failures. They possess excellent resistance to wear or to scoring and galling. Freedom from hard spots promotes a high degree of machinability.

Meehanite metal has high tensile strength, high compression and fatigue strength to resist line loading, relatively low notch-sensitivity and self-lubricating properties together with excellent vibration damping qualities which result in smooth quiet operation. Hardness values ranging from 170 to 550 Brinell may be obtained.

For additional information about Meehanite Metal as a gear material write for your free single copy of Bulletin 42 today.



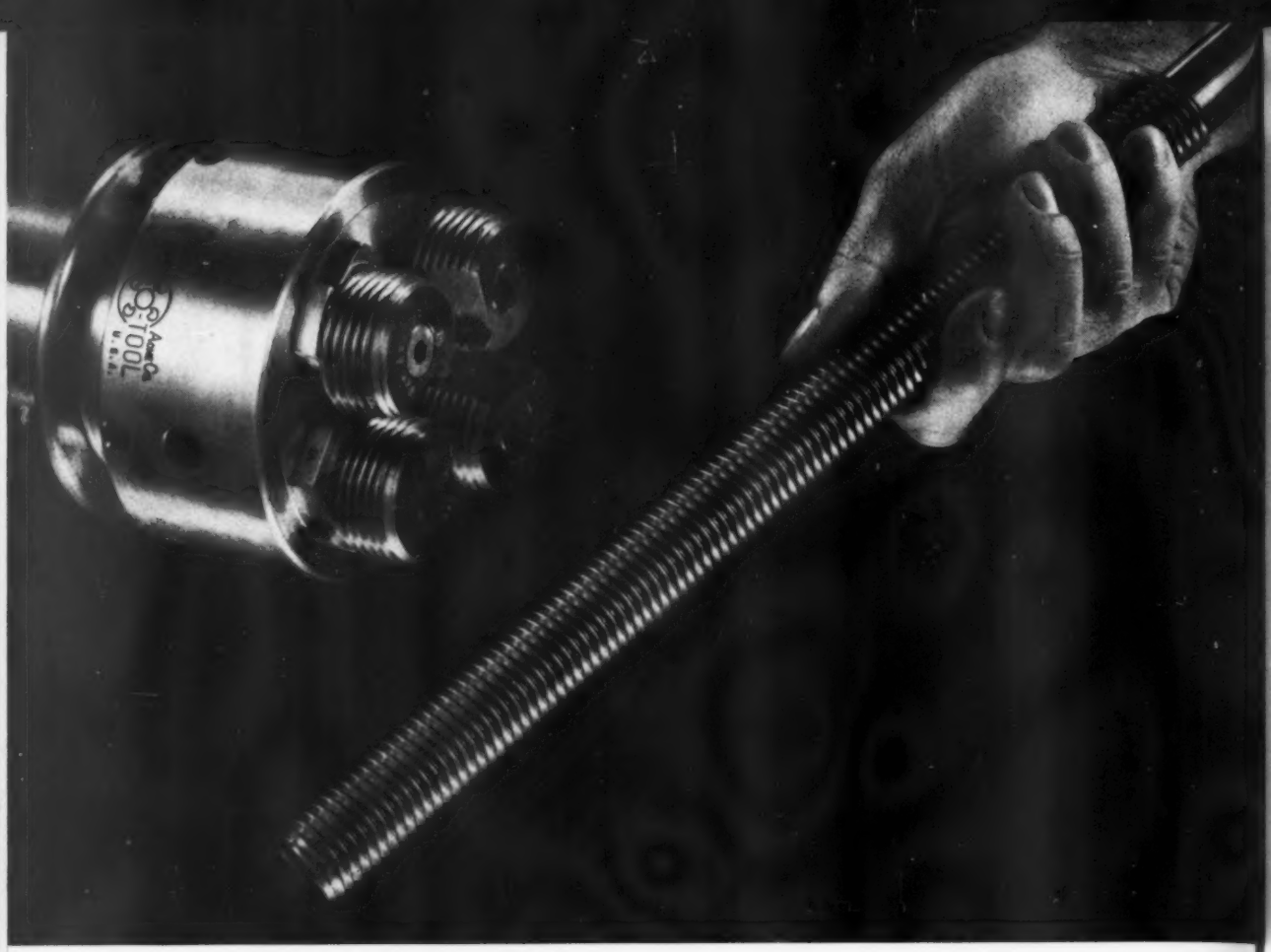
Each type of Meehanite metal is a product of controlled structure. This is a typical microstructure of type GA, Meehanite® showing controlled amounts of graphite in a strong and tough pearlitic matrix. Tensile strength 50,000 psi min; compressive strength 175,000 psi; Modulus Elasticity 20,000,000. Fatigue strength 22,000 psi.

MEEHANITE BRIDGES THE GAP BETWEEN CAST IRON AND STEEL®

MEEHANITE METAL

MEEHANITE METAL CORPORATION, NEW ROCHELLE, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 105



VERS-O-TOOL cuts 10.3 miles of thread per grind on this job . . .

The Federal Screw Works had a real problem in threading. They had received a large order for 1″x13″ adjusting screws. Using most thread cutting methods this would be a big, costly assignment.

Federal put a Namco 1⅝″ DR Vers-o-Tool on the job and as a result, found they had to grind the chasers only once for approximately 2000 pieces. This means that each grind cuts well over 10 linear miles of thread. Threading cost per piece was amazingly low.

Remember, Vers-o-Tools can be used with your present turning equipment, lathes, drill presses or automatics. No investment in special machines required.

Find out how you can put Vers-o-Tools to work reducing your thread cutting costs. Write for a free copy of Booklet DT-52.

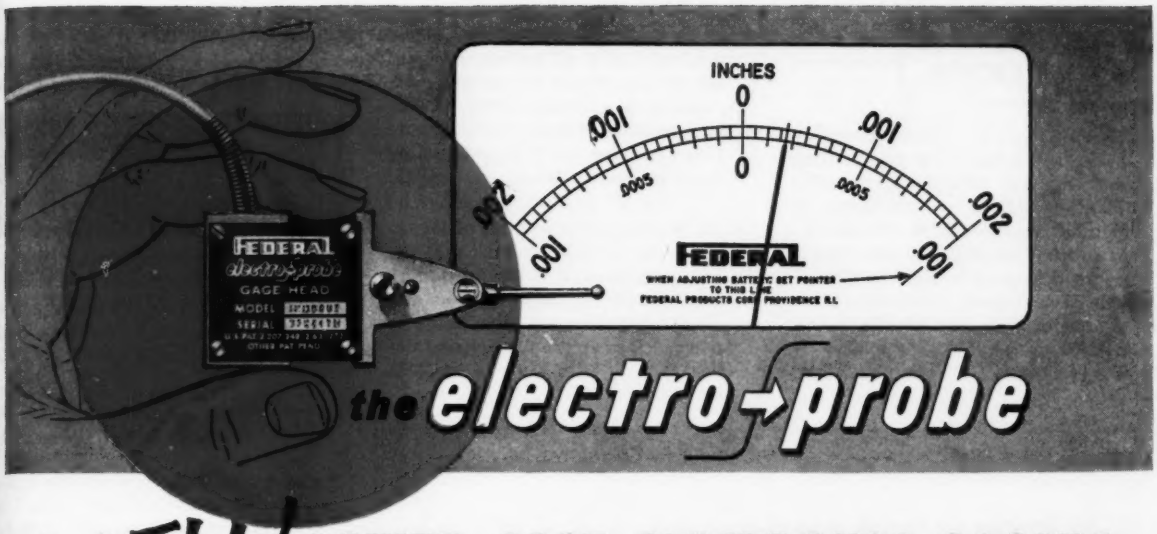
You can grind and regrind Vers-o-Tool circular chasers to a full 270° of the chaser circumference.

See Vers-o-Tools demonstrated at the A. S. T. E. Tool Show in Philadelphia, May 1-8, Booth #2115

National Acme

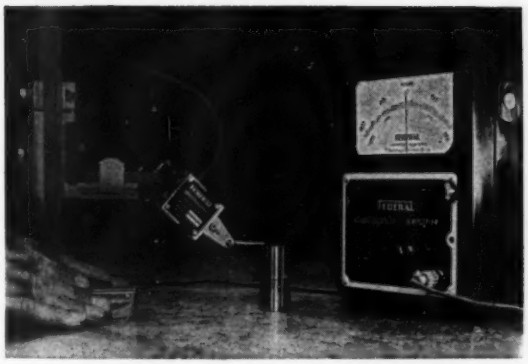
THE NATIONAL ACME COMPANY, 169 E. 131st St., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 106



NEW LOWER COST ELECTRONIC GAGING

The new Electro-Probe Model 230 P-2 introduces a new concept in Dimensional Control. It is far more than just another electronic test indicator.



1. Take it anywhere. Model 230 P-2 is completely portable and self-contained. It consists of a bantam size electronic gage head and transistor amplifier which, with metal carrying case and accessories, weighs only 8½ lbs. It is completely independent of external power, and electrical parts are hermetically sealed.

2. Mount it on any conventional fixture. No special stand or holding fixture is required because gaging pressure is extremely light (less than 2.5 grams). Supports which would deflect under even normally light gaging pressures remain rigid when the Electro-Probe is used. And the gaging pressure remains constant throughout range (change is less than 0.1 gram per .001″).

3. Set it up in a jiffy. Now you have Precision *without* time-consuming adjustments. Master it anywhere within its range because response is so linear. Full scale Zero Adjustment makes positioning easy and fast. Warm up time is virtually zero. Gage when *you're* ready!

4. Gage with ease and assurance. Contact has friction-free travel of ± .015″. Clutch mounting allows head to be placed in almost any position and provides complete over-travel protection. Either of two magnifications instantly available. Wide 4½″ dial easy to read.

5. Enjoy greater reliability than ever before. Use of **Printed circuits** and **transistors** means trouble-free performance. Connections are sure, operating current amazingly low — no heating or voltage regulation problems, no dependence on electrical outlets. Learn more about this truly portable, reliable, accurate and versatile gaging device.

Write for Literature.

FEDERAL PRODUCTS CORPORATION
8234 Eddy Street • Providence 1, R. I.

Packaged for convenience

Electro-Probe gage head, self-powered amplifier and accessories, all in one lightweight case . . . easily carried from job to job.

The Electro-Probe principle has exciting advantages in other fields of gaging. Ask us.

Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

CIRCLE INFORM-A-GRAM KEY NO. 107

TOOL SHOW PREVIEWS

- Among the new higher precision and lower production cost tooling instruments developed by The Sheffield Corp., a subsidiary of Bendix Aviation Corp., are the Eli Whitney Unipoint internal measuring instruments and the Featherhead gage head. Also to be seen at Booth 222 are Precisionaire gages and hole coordinate measuring machines. (S44)

- Precision end mills will be demonstrated on a milling machine, and will operate at all speeds and feeds on various types of materials including aluminum, steel, brass, and plastic. Eclipse Counterbore Co. will also exhibit end-cutting tools in Booth 344. (S45)

- To be seen at the exhibit of Porter Precision Products Co. will be new standard punches and dies. Also at Booth 1821 will be odd shaped punches and dies made to the user's individual need and design. (S46)

Ehrhardt/St. Louis

A nation-wide Service
to the few
who want the most
in high precision gauges,
dies, jigs and fixtures

Ehrhardt/St. Louis

Sectional Ground Dies, Carbide Lamination Dies,
Elox Method of Threading & Cutting, Jig Boring & Grinding,
Engineering & Designing Facilities

Ehrhardt Tool and Machine Co.
914 Monroe Street, St. Louis 6, Missouri

Send for 24 page brochure, illustrating our Facilities

CIRCLE INFORM-A-GRAM KEY NO. 108

- Precise Products Corp. will introduce a new line of versatile power tools at Booth 1155. Among the tools will be a high speed univer-

sal type bench-mounted milling machine with exclusive Electro power drive. The working head of this machine is the Super 80 power quill (illustrated). (S47)

- New reversible Safe-Torque tap driver prevents tap breakage, increases tap life, reduces rework and scrap, and controls the number of threads and tap depth. In addition to this product, a Safe-Torque hand screw driver and clutches, and spindle and tool holders will be on display at Booth 1635 by Scully-Jones and Co. (S48)

- Mel-Trol, a quality control system used in specialty steel production, will be spotlighted by The Carpenter Steel Co. Benefits of the four-part process will be explained at Booth 725. Illustrations will show typical uses and features of tool steels and high temperature alloys made under the process. (S49)

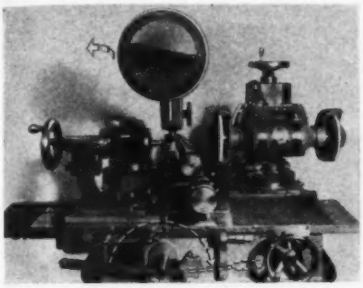
- Two Brushamatic machines, the 51-2L and the 3A-M, will be exhibited at Booth 1434 by The Osborn Mfg. Co. The Brushamatic method for the removal of burrs, etc. by a brushing action can be used for the finishing of rough, heavy work to the most precise finishing of aircraft components. (S50)

- Highlighting the display of Lovejoy Tool Co. will be two new cutters. One is the Shear-Joy, shown here, featuring a high positive

axial rake and a negative radial rake. The second, an indexable throwaway cutter called Joy-Dex, with an adjustable anvil, will also be demonstrated at Booth 1870. (S51)

TOOL SHOW PREVIEWS

- The R-O universal form relieving fixture and grinder with optical comparator will be shown at Booth 519 by Royal Oak Tool and Machine Co. for the first time. The attachment, mounted on a bracket attached to the grinder, swings from an out-of-the-way position to bring the lens over the work. (S52)



- Various precision measuring tools, gages, and inspection equipment, including the Scherr Micro Projector, toolmakers microscope, and OMT optical rotary table, will be demonstrated at Booth 445. Gear hobbing and testing equipment will also be shown at the combined exhibit of George Scherr Co., Inc. and Tubular Micrometer Co. (S53)

- Ferguson Machine Corporation's Booth 605 will feature standard basic equipment and components for high speed production and automatic assembly. Included are precision indexing mechanisms, standard rotary and in-line assembly machine bases, index tables, and a new combination index table and punch press. (S54)

- Presented at Booth 1760 by Wisconsin Drill Head Co. will be the Multi-Tap lead screw tapping machine. It is designed for production tapping, and is readily adaptable for single spindle use. The machine will be displayed with the optional coaxial air-operated rapid approach and rapid return feature. (S55)

- Tumble box jigs will be exhibited by Standard Parts Co. at Booth 1173. The new aluminum jig offers 6-side utility, and because the legs project, head-type bushings may be used on sides, top, or bottom, as required. Weight has been reduced one-half, making the jig easy to handle. (S56)

- A line of die sets with exclusive handling features will be on display in Booth 505 by Superior Steel Products Corp. They will demonstrate the removable cap guide pin that ends troublesome binding in parting die sets. The pin permits one man to part a large die set in a matter of minutes. (S57)

- One of the feature exhibits of the U. S. Burke Machine Tool Division will be the Quartet milling machine which performs horizontally, vertically, angularly, and universally. Other machines on exhibit at Booth 1261 will be the automatic precision spindle No. 1 milling machine and the Duplex half mill. (S58)

- Products to be exhibited at Booth 1717 by Tubular Rivet and Stud Co. include a multi-head riveter; Model 109 double-drive, adjustable center machine; and the Model 104, which automatically feeds, inserts, and sets simultaneously two rivets up to and including 0.130" body diameter with each stroke. (S59)

"...and I thought I knew all about lathes!"

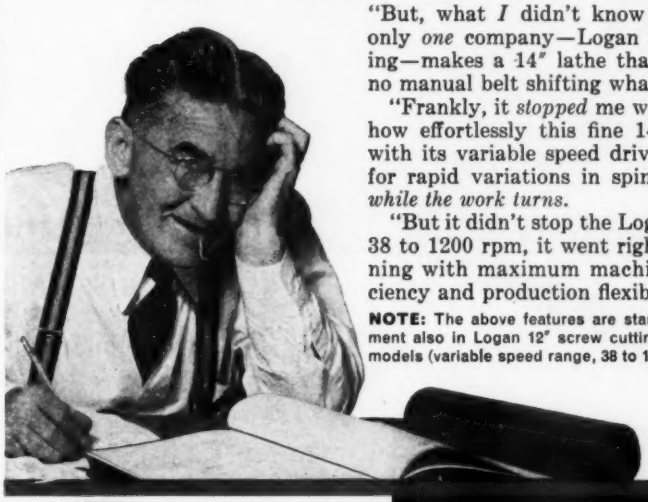
"Every Production Engineer knows that when you have to disassemble any portion of a lathe's headstock in order to replace belts it means production slow-downs and the chance of a careless or inexperienced operator's misaligning or improperly reinstalling bearings, spindle, or other parts.

"But, what *I* didn't know was that only *one* company—Logan Engineering—makes a 14" lathe that requires no manual belt shifting whatever.

"Frankly, it *stopped* me when I saw how effortlessly this fine 14" Logan, with its variable speed drive, adjusts for rapid variations in spindle speed *while the work turns.*

"But it didn't stop the Logan! From 38 to 1200 rpm, it went right on running with maximum machining efficiency and production flexibility!"

NOTE: The above features are standard equipment also in Logan 12" screw cutting and turret models (variable speed range, 38 to 1400 rpm).



LOGAN 14" SWING LATHE

Logan

The Logan line includes lathes from 9" swing and 17" between centers to 14" swing and 40" between centers. Also 8" shapers.

LOOK AT A LOGAN BEFORE YOU LEAP

Catalog on request. Phone your Logan dealer or drop a line to:

LOGAN ENGINEERING CO. Dept. M-458, 4901 Lawrence Ave., Chicago 30, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 109

FOR THE DIEMAKER WHO HAS EVERYTHING...

. . . everything but a good source for die sets,
here's a suggestion.
Die sets are basic to mass production.
They don't need
gadgets, gimmicks or glamorous-styling.
Production depends on
sound design, quality materials, accuracy
and reliability, and
at reasonable cost and delivery time.
That's the way it is
with Detroit die sets. Why don't you
try them today.

Detroit Die Set builds and stocks over 2,000 different die sets plus specials of all types. Ask for new catalog without obligation.

Detroit
DIE SET
CORPORATION

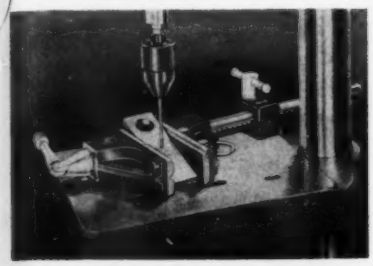
2895 WEST GRAND BOULEVARD • DETROIT 2, MICH.

OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

CIRCLE INFORM-A-GRAM KEY NO. 110

TOOL SHOW PREVIEWS

- Fully-automatic Wahlstrom chucks and tapping attachments and AMF Floating-Lock Instant-Change drill press vises (pictured), which turn

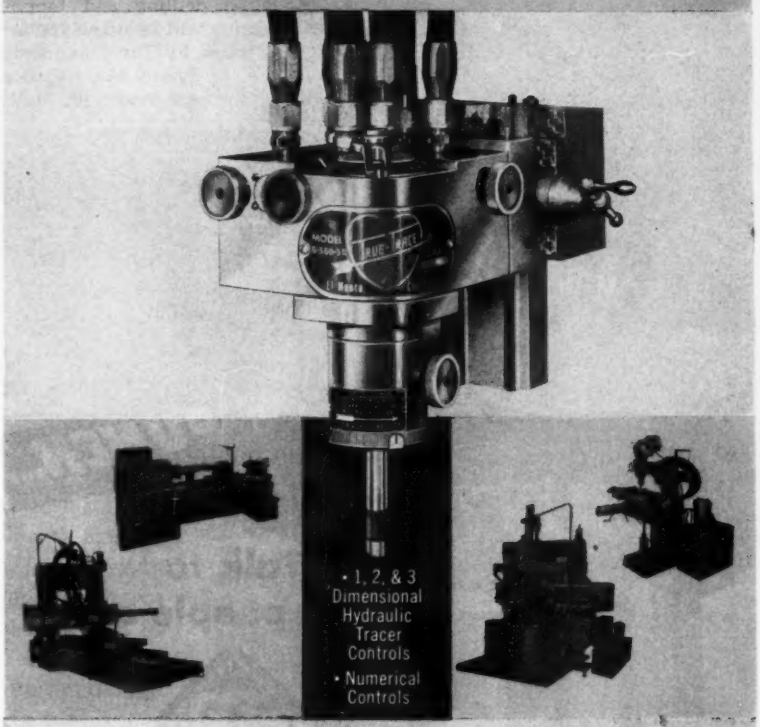


a drill press into a complete machine tool, will be exhibited by AMF Tool Div'n at Booth 1164. The AMF Wahlstrom eliminates 95% of lost tool changing time. (S60)

- A feature at Booth 2055 will be the padded shipping bag manufactured by Jiffy Mfg. Co. Also to be shown will be the macerated paper pads and Kushion Kraft for the interior packaging of various types of tools and equipment. (S61)
- Magnaflux Corp. will exhibit and demonstrate a wide range of nondestructive testing systems and equipment at Booth 102. Included will be the Sonizon SO-200 portable ultrasonic thickness measuring instrument, and Spotcheck, a spray-on dye penetrant inspection method. (S62)
- A new comparator for inspecting leading and trailing edges of turbine blades and vanes will be on exhibit by Jones & Lamson Machine Co. at Booth 1504. Design of the fixture permits inspection of blades with chord lengths up to 5½" and overall blade lengths from 1" to 9". (S63)
- The exhibit of Harco Engineering at Booth 428 will include samples and photographs of such items as jig and fixture components, including details, fixture clamps, fixture keys, and die pad retainers. (S64)
- The Torrington Company, Swaging Machine Div'n will exhibit a standard model rotary swaging machine, with a plexi-glass face plate to show the swaging action. Also to be shown at Booth 1216 is the electro-hydraulic die closing rotary swaging machine. (S65)

"AUTOMATE" YOUR MANUAL MACHINES

...WITH TRUE-TRACE CONTROLS!



Outmoded, manually-operated machines cost money, reduce production capacity and waste skilled labor. Modernize your existing machines with **True-Trace** machine tool controls—increase your ability to produce high quality parts economically.

Our factory representatives from coast to coast, and three factory sales, engineering and service centers are ready to show you how to increase production on your contoured parts or straight line machining ... yet achieve close tolerances! Let us assist you with your contour machining problems.

Before specifying ordinary controls, check **all** the facts ... investigate ... get expert in-plant recommendations. See why **more** True-Trace controls are used as original equipment by **more** machine builders than all other controls combined. **Write for our new 24-page, illustrated bulletin SB-1—TODAY!**

"Sponsors of the Contour Machining Conferences"

TRUE-TRACE SALES CORPORATION

9830 E. Rush St., El Monte 39, California

Branch Plants: 35 Urban Ave., Westbury, Long Island, New York

2401 Eaton Lane, Racine, Wisconsin

Dealers in Principal Cities

CIRCLE INFORM-A-GRAM KEY NO. 111

TOOL SHOW PREVIEWS

- The "Automation" lines of air and hydraulic cylinders are designed specifically to meet the most exacting demands of high-speed, automatic production. These cylinders are highly versatile, and fabricated to give maximum efficiency and long life with minimum maintenance. Ortman-Miller Machine Co., Inc. is showing them at Booth 612. (S66)

- A demonstration of a multiple-spindle nut tapping machine will be seen in Booth 1738. The heart of the machine is a 100-spindle Zagar gearless tapping head coupled with a vibratory hopper for almost automatic operation. It taps 10-32 blanks at the rate of 72,000 pcs/hr. (S67)

- Production drilling and tapping attachments will be displayed and demonstrated by The Commander Mfg. Co. at Booth 945. Visitors will see the new Model 400 Multi-Drill, an extremely close-coupled and compact multiple spindle drilling attachment which can be furnished to fit any drill press. It is for applications where no more than 4 holes are to be drilled or tapped at one time, and where the hole pattern is equally spaced. (S68)

- Four Webber Micro-Accurate optical height gages and the new Webber Gage Co. square gage blocks (illustrated) will be introduced at Booth 302. The height gages, designed for quick and accurate measurements of heights to 25", 37", 49", or 61", measure to accuracies of ±0.000005" per inch of height. (S69)

- Exhibited at Booth 123 will be newly designed low-cost split plug-type thread segments for checking pitch diameter of internally threaded parts. Bryant Gage Division says these segments can be mounted on either the B-21 bench or the P-21 portable Bryant indicator-type thread comparators. These segments are made to gage single threads. (S70)

- The Johnson Gage Co. will show a complete line of gages and comparators for checking both internal and external screw-threads, at Booth 304. Accessories and attachments for checking the concentricity and squareness of related surfaces will also be displayed. (S71)

- Operating models of electro-magnetic vibratory feeders, vertical-vibratory small parts feeders, and bin vibrators will be seen at Syntron Company's Booth 2147. Also displayed will be a line of vibratory lapping machines. (S72)

- Main attraction at the Northwestern Tools, Inc. Booth 968 will be the new nylon-plastic shoes for toggle shoe clamps. The material is light, tough, abrasion-resistant, a good insulator, and wear resistant. (S73)

If your feeling the PINCH...
For want of a PUNCH...
Talk to the people at
3P
It's a fast service company, staffed with personnel who know that "DOWN-TIME" is "LOST-TIME". Distributors in principle cities assure IMMEDIATE DELIVERY from over 37,000 sizes in stock.
You get the finest quality in 3P HEAD PUNCHES and DIE BUTTONS, because they are made from 3 types of the finest tool steel, and are available in any DECIMAL size.
NEVER FEEL THE PINCH!
GET 3P PUNCHES AND DIE BUTTONS WHEN YOU NEED THEM.
*Reg.
"Still the best performer"
Porter Precision Products also make BAL-LOK* Punches and Die Buttons. They're always in stock and ready for IMMEDIATE DELIVERY too. Any DECIMAL size.
NO EXTRA CHARGE FOR FAST SERVICE HIGH QUALITY, OR ODD SIZES.
PORTER PRECISION PRODUCTS
PRinceton 1-6338 • P.O.Box 208 • Cincinnati 15, Ohio
CIRCLE INFORM-A-GRAM KEY NO. 112

John Dewhurst tells how the Moore Jig Borer pays off in production of instrument components

This is another in a series featuring the views of owners of leading tool and die companies

by **JOHN D. DEWHURST**
President
Arrow Tool Company, Inc.
Wethersfield, Conn.
Prototype and Production
of Instrument Components

"Consistent accuracy is the keystone of our ability to satisfy our customers. They demand production quantities of instrument components and assemblies varying in size, materials, and form...*finished to the same precise tolerances as their prototypes.* It's been our experience that Moore Jig Borers can be depended upon to do such jobs, and most economically, too.

"Since we need fine precision for both tooling and production, our Moore Jig Borers are invaluable. First, we use the Moore Jig Borer to hold tolerances on our tools and gages. Then, we use the *same* machine for a production run of 50 to 70 hours a week. Over a period of several years, our Moore Jig Borers have averaged 3100 production hours per year, holding tolerances to 'tenths,' and providing an unbeatable record of trouble-free performance."

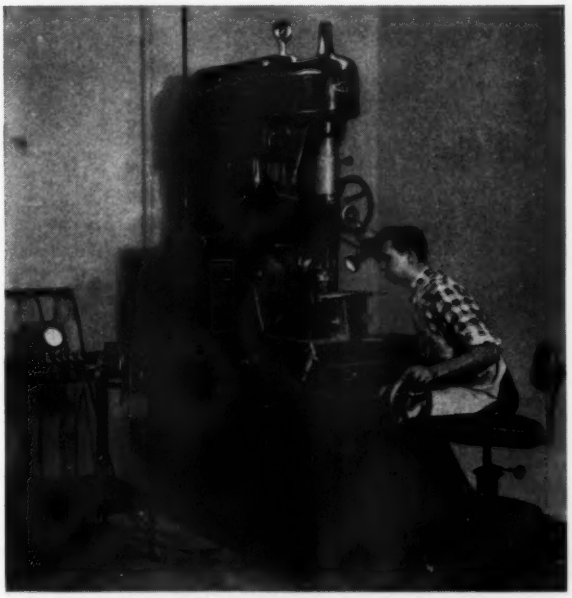
If high-precision quality production is your goal, learn how flexible Moore equipment can help you achieve it. Booklets describing the unique features of Moore Jig Borers and Jig Grinders can be obtained by writing...

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts *the modern way.* 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

See the latest in Hole Location Equipment at Booth No. 1249, ASTE Tool Show

ON SMALL COMPONENTS such as this brass block, Moore Jig Borers quickly bore close-tolerance holes. This workpiece will be part of an electronic data processing machine.



MEDIUM SIZE CASTINGS are precision-bored on this Moore Jig Borer. At Arrow Tool, Moore Jig Borers average 3100 hours per year in high-precision production operation; serve "double-duty" in holding tooling tolerances.

MOORE TOOLS

FOR TOOLING...AND PRODUCTION

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 113

TOOL SHOW PREVIEWS

- The Pullmax Model P-9 universal shearing and forming machine, to be shown at Booth 1722, has a cutting capacity up to ⅜" in mild steel and ¼" in stainless steel. Its features, to be demonstrated by American Pullmax Co., Inc., include the quick locking attachments and fast changing of tools which permit straight, circular, or irregular shearing, slotting, nibbling, etc. (S74)

- Visitors at Booth 414 will see a complete line of solid carbide head tools for general boring, bottoming, and facing. The solid carbide tool head made by Bokum Tool Co., Inc., replaces the carbide tip and provides a full 210° of life. (S75)

- The Jersey Mfg. Co. will show the Jemco ARBO-2 automatic revolving indexing multi-spindle drill head that takes 2 to 7 tools at one time at Booth 2154. This unit will convert any vertical single spindle drill press into a multi-spindle machine. (S76)

- Among the new products to be exhibited by U. T. Tool Co., Inc. will be the ACR-1040 motor-driven

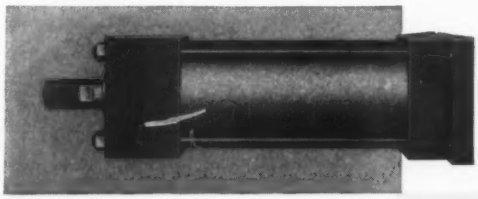
centralizing stock reel shown here. This machine is suitable for material up to 10" wide and coils with 40" OD. See these machines at Booth 1554. (S77)

- A new type of spiral flute stub taps, designed to solve problems frequently encountered when using standard taps in screw machines, will be shown by Jarvis Corp. at Booth 1417. The Jarvis spiral flute stub tap has excellent shearing action and superior chip ride-out. The section immediately behind the threads is necked down below the root diameter to provide more chip room, reduce drag, and facilitate application of cutting oil or coolant to cutting edges. (S78)

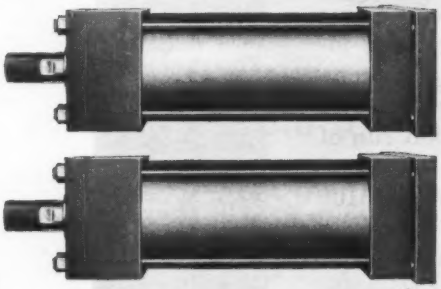
- McCrosky Tool Corp. will announce two new lines of milling cutters at Booth 949, designed especially for milling with throw-away carbide inserts. Also on display will be the turret tool post with clamping type handle. This tool enables the turret to withstand vibration and remain tightly locked, even when handling is interrupted or heavy cuts are taken. (S79)

- The Threading Tool Division of The National Acme Co. will show its line of Vers-O-Tool threading and hollow milling heads and Acme-Fette self-opening thread rolling heads. Booth 2115 will be the scene of the demonstration. (S80)

- Robert H. Clark Co. will be represented at Booth 1901 by M-3 type spade drill, which is designed to expedite production of holes in heat treated alloy steels, stainless steel, etc. They will also show finishing and roughing bars, and an adjustable boring tool. (S81)



A LOGANSQUARE CYLINDER
2 competitors' cylinders



do they LOOK ALIKE?
...sure they do on the surface...

...BUT LOOK AT Logan's BIG EXTRA PLUS VALUES

Logansquare Cylinders
are made to interchange with other leading manufacturers' cylinders . . .

1 Logan designs assure the service required for those extra-rugged applications.
2 Over FORTY YEARS of cylinder manufacturing know-how.
3 Built by CRAFTSMEN whose average service record with LOGAN is more than 20 years.
4 Manufactured in a plant which applies the most modern production methods.

FREE
SEND FOR THE "LOGAN CALCULATOR"

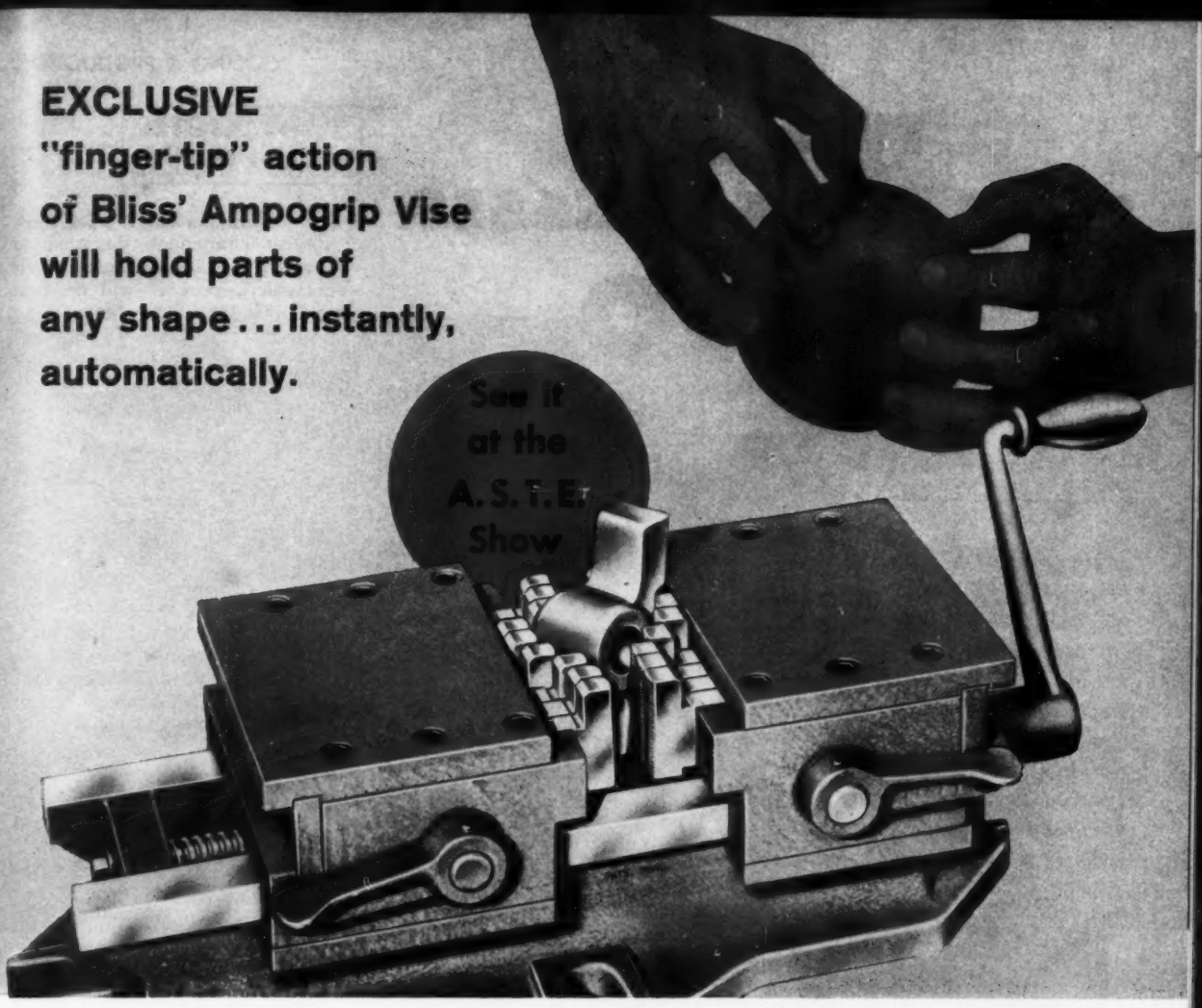
LOGANSPORT MACHINE CO., INC.
844 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:
☐ 100-1 AIR CYLINDERS
☐ 100-2 MILL-TYPE AIR CYLS.
☐ 100-3 AIR-DRAULIC CYLS.
☐ 100-4 AIR VALVES
☐ 100-5 LOGANSQUARE CYLINDERS
☐ 100-6 ULTRAMATION CYLINDERS
☐ 200-2 PRESSES
☐ FACTS OF LIFE
☐ 200-1 HYD. POWER UNITS
☐ 200-2 ROTOCAST HYD. CYLINDERS
☐ 200-3 750 SERIES HYD. CYLINDERS
☐ 200-4 AND 200-7 HYD. VALVES
☐ 200-6 SUPER-MATIC CYLS.
☐ 200-1 CHUCKS
☐ ABC BOOKLET
☐ CIRCUIT RIDER

TO:
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____

CIRCLE INFORM-A-GRAM KEY NO. 114

EXCLUSIVE "finger-tip" action of Bliss' Ampogrip Vise will hold parts of any shape... instantly, automatically.



Greater holding power makes faster feeds and deeper cuts possible

The Ampogrip vise can help you cut the machining time you now require for those tough-to-hold parts *simply* by holding so tightly that you can take far deeper cuts and faster feeds. Ampogrip holds *anything*—even a ball.

All you have to do is tighten up the vise and go to work—at faster rate than ever before. And when you finish one piece—you simply back off the jaws slightly without realigning the fingers and they remain properly positioned ready for you to drop in the next piece. Shape, grind, drill, mill or whatever you will, the Ampogrip will start making money the day it arrives.

You'd find added savings when you use it as a *standard* substitute for *special* fixtures—those costly, one-of-a-kind set ups that you can never use again. In fact, you can use your Ampogrip as a *universal* fixture for any and all types of machine tools—wherever work must be held . . . for short run or long. Write today for complete information.

Ampogrip vises used in this Blanchard set-up, sped grinding by 10:1

dieco DIE SETS

E. W. BLISS COMPANY

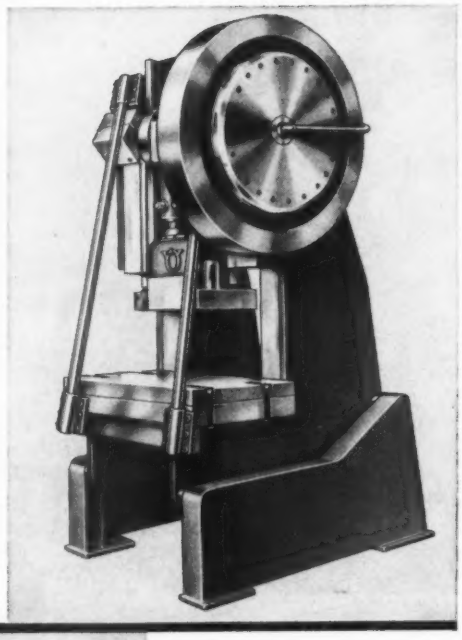
DIE SUPPLY DIVISION

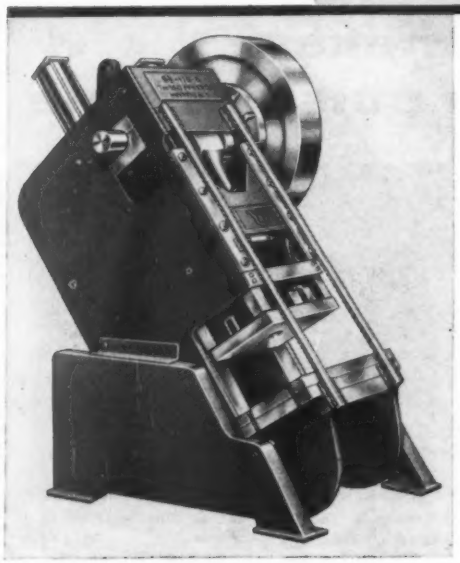
Cleveland • Ohio

CIRCLE INFORM-A-GRAM KEY NO. 115

TWO NEW LONG SLIDE PRESSES by V&O

High speed 60-Ton T-Line Press, built to JIC Specifications, with 4" stroke operating at 150 SPM; low inertia air clutch with electrical controls; slide has detachable head to simplify changing from standard to flanged slide face; hand or air operated inclining mechanism.





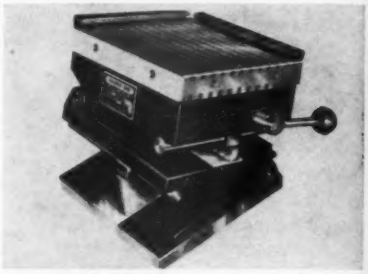
Box-slide 110-Ton Inclinable (JIC Specifications) features exceptionally long ways (35") with new type power slide adjustment that eliminates movement between Pitman connection and slide; self-cooling combination clutch and brake with friction surfaces replaceable without removing flywheel.

EMHART MANUFACTURING COMPANY
THE V & O PRESS COMPANY DIVISION
HUDSON, NEW YORK

SEE BOTH UNITS AT SHOW—BOOTH 721
CIRCLE INFORM-A-GRAM KEY NO. 116

TOOL SHOW PREVIEWS

- The Robbins line of angular work holding equipment, designed to save setup time on angular grinding and inspection, will be seen at Booth 1661. The Magna-Sine magnetic sine plate, (illustrated)



and the non-magnetic sine plate will be featured. Omer E. Robbins Co. has added ribbing on base plates and intermediate plates for greater strength and rigidity. (S82)

- The reflex interference viewer manufactured by The Van Keuren Co. will be one of the features of the company's exhibit at Booth 419. Also to be presented are a line of coated optical flats and duplex plug gage handles. (S83)

- Of special interest at Booth 2101 will be a new barrel finishing machine designed to handle small and medium lots. It will handle a 700-lb work load. Almco-Queen Products Inc. will also have a plexi-glass finishing barrel in operation at the display. (S84)

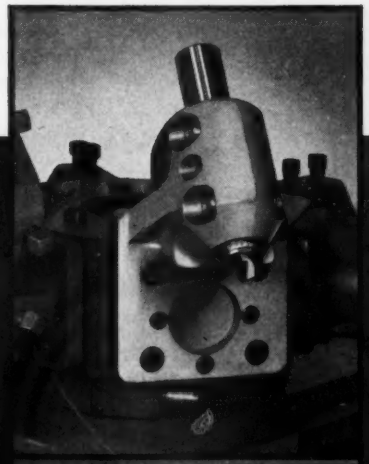
- A variety of new models in the Skyline Series, some connected to an air supply to demonstrate actual on-the-job conditions, will be shown in Booth 818-814, by Ross Operating Valve Co. All feature long life and interchangeability of heads and bodies. (S85)

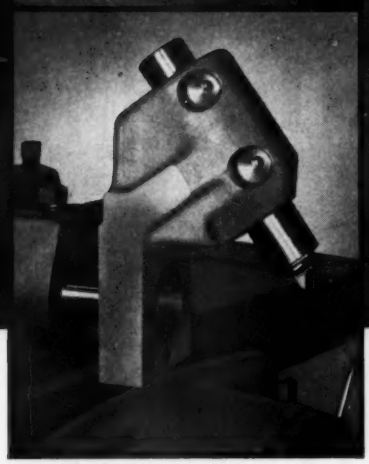
- Conduct-A-Lite, used for the inspection of recessed surfaces, holes, or tubes, will be on display at Booth 2001 by Foster Supplies Co. The company will also exhibit a micrometer height gage and a DiaTest bore gage. (S86)

- Universal perforating equipment, developed to perforate and notch flat work or shallow formed sections, will be on display by S. B. Whistler & Sons, Inc. at Booth 1525. Also to be seen is magnetic perforating equipment. (S87)

new microbore turning heads feature speed, ruggedness, precision!

Flange Mounting Heads mount directly on the face of the turret providing extreme rigidity.





Shank Mounting Heads permit quick, easy mounting in the turret and maximum versatility.

STANDARD, GENERAL PURPOSE FOR ALL HORIZONTAL TURRET LATHES!

Rugged, rigid and adjustable in seconds, these new general purpose turning heads perform a variety of single and multi-diameter operations repetitively with unfailing accuracy. Microbore's exclusive micrometer vernier adjustment provides a fast, accurate means of setting the tool point over a wide working range. *0" to 4" for Shank or Flange Mounting Heads. 0" to machine capacity for Plate Mounting Heads.* Extreme rigidity throughout permits heavy stock removal while holding to closest tolerances. This combination of speed, ruggedness and precision reduces downtime, increases accuracy of the end product. Write for complete information.

VISIT MICROBORE BOOTH No. 1549
at the A.S.T.E. Show, May 1-8th

See these new developments:

- **Pre-Set Tooling**
- **Tool Designers Layout Kit**
- **Flash-Change Bridgeport Spindle**
- **Turret Lathe Tooling**

DeVlieg Microbore® System

DE VLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY

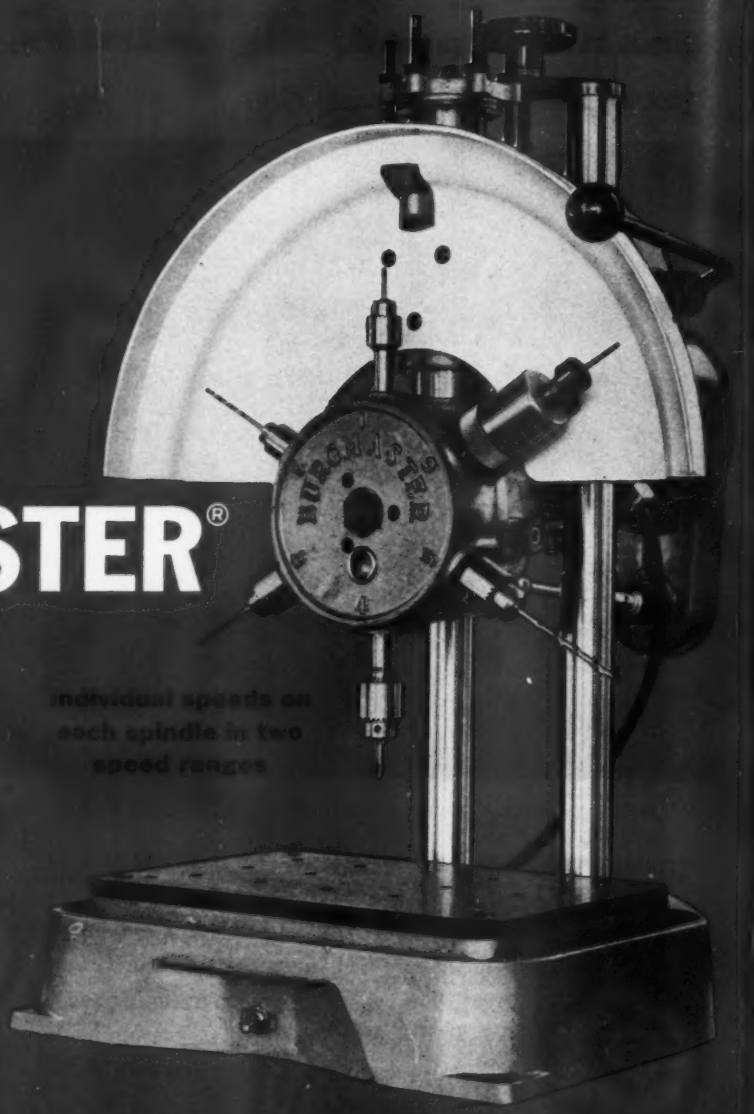
2720 West Fourteen Mile Rd., Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 117

a sensitive, short or long run tool especially developed for machining small parts to close tolerances

THE NEW BURGMASTER®

Bench Model



individual speeds on each spindle in two speed ranges

$550.00

12-speed, 6-spindle, power-indexing Bench Model Turret Drill

Drilling, tapping, reaming, counterboring, countersinking, spot facing and numerous other second operations can be accomplished — with one operator — in one location — quickly and simply. The Burgmaster principle is basic. Each tool change is brought *to* the work. The need to carry or shove, then realign the work manually is eliminated. Time loss is cut, accuracy is increased, fixture costs are reduced.

SPECIFICATIONS: capacity, 3/16" in steel, 1/4" in aluminum; overall dimensions, height, 31½", width, 17", depth, 20"; motor, ¼ hp; chuck to base clearance, 12"; maximum spindle travel, 2⅞"; center of spindle to column clearance, 5¾"; geared head permits each spindle to operate at its own predetermined speed from 350 to 6200 rpm.

BURGMASTER BENCH MODEL AUTO INDEXING TURRET DRILL & TAP MACHINE

CALL YOUR DISTRIBUTOR

Phone, wire or write Dept. TP-4

BURGMASTER CORPORATION
Small Tool Division,
Burg Tool Manufacturing Co., Inc.
13226 S. Figueroa St., Box 311, Gardena, Calif.
Phone: FAculty 1-3510

CHICAGO — Burgmaster Corp., 5329 Lincoln Ave., Chicago 25. Phone: LOngbeach 1-1178 • **RIDGEWOOD, N. J.** — Burgmaster Corp., 86 N. Maple Ave. Phone: Gilbert 4-3002

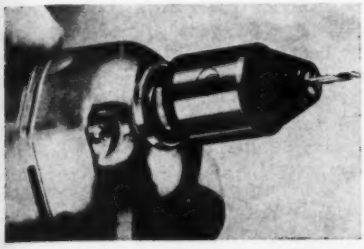
Cuts Costs • Saves Space • Increases Production

World's largest manufacturer of turret drills

CIRCLE INFORM-A-GRAM KEY NO. 118

TOOL SHOW PREVIEWS

- A new keyless chuck for portable drills will be displayed by Supreme Products Corp. at Booth 734. The chuck will not jam nor

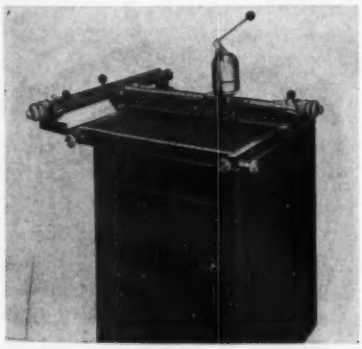


loosen during drilling, and operates within acceptable limits of runout. Models for either electric or air drills fit ⅜" x 24 drill spindles. (S88)

- In addition to the line of precision metal and non-metallic balls, Industrial Tectonics, Inc. will show standard and custom-built stainless steel fixture and checking balls at Booth 427. They are used as reference points in jig and fixture work. A Ballizing machine and Ball-O-Matic fixture will also be shown. (S89)

- Featured in Booth 2135 will be the Model B-360A fully automatic tracer manufactured by True-Trace Sales Corp. This unit, which will be in operation at the show, can be changed from fully automatic 360° to manually controlled 360° or manual 3-dimensional cutting. Also on display will be the True-Trace ACA numerical control system. (S90)

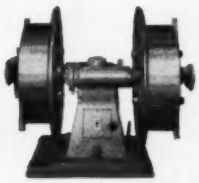
- To be shown for the first time is a precision drilling machine developed by Wales-Strippit Co.



This machine eliminates height gage layout and common errors in drilling sheet metal templates. Look for Booth 1622. (S91)

LITTELL REELS

No. 5 AUTOMATIC CENTERING REEL
Ball bearing smoothness. Adjustable brake. Adjustable in height. Tilts to any angle for unreeling. Takes coils up to 600 lbs., 10" wide. 46" max. O.D., 8½" to 20" I.D.



No. 25-18 DOUBLE REEL
Automatic centering. Reserve coil is swiveled and locked in Pay-out position in seconds. Adjustable electric brake. 2500-lb. coil on each side.

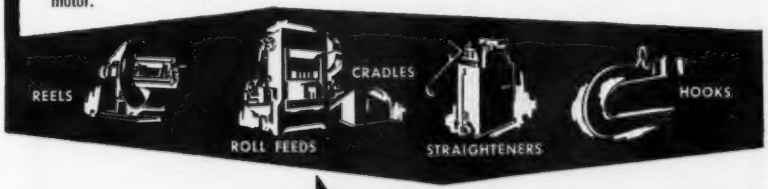
No. 60-30 MOTOR DRIVEN REEL
with automatic centering. Takes up to 6,000 lb. coils, 30" wide. 48" max. O.D. 16" to 20" I.D. 3 HP, 1200 rpm motor.

AUTOMATE...
HANDLING OF COILS FROM 100 LBS. TO 20 TONS

A Littell Reel *best* meets your need for fast, safe coil handling and accurate pay-off. The Littell Line offers all types of reels as well as all sizes . . . Manual Reels, Motor Driven Reels, Double Reels and the newest design Brake Reels. All are designed and built with the engineering and experience that has made Littell Reels the standard of performance since coil stock first came out.

FAST DELIVERIES
from complete stocks in the newly enlarged Littell plant.

SEE OUR CATALOG IN SWEET'S



Use this coupon for the Littell Reel Catalog.

F. J. LITTELL MACHINE CO.
4197 Ravenswood Ave.
Chicago 13, Illinois
District Offices: Detroit, Cleveland

F. J. Littell Machine Co.
4197 Ravenswood, Chicago 13, Ill.
Send Littell Reel Catalogs "D"

NAME _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

R

CIRCLE INFORM-A-GRAM KEY NO. 119

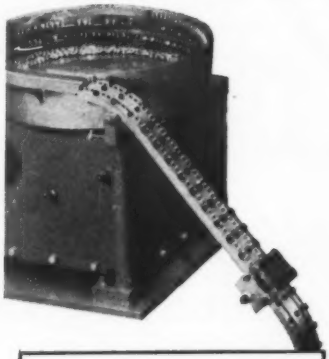
The FIRST STEP to AUTOMATION

with

SYNTRON

Complete Vibratory

PARTS FEEDERS



SYNTRON can supply complete Parts Feeders to your specifications — drive unit, oriented bowl and discharge track with escapement devices.

Send parts and specifications to our engineers for detailed information and recommendations.

See SYNTRON'S Display at the ASTE Tool Show Booth 2147 South Hall

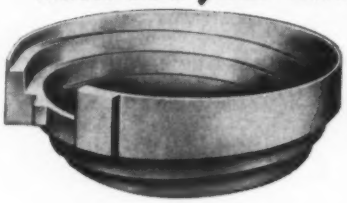
or

work out your own orientation problems

starting with

SYNTRON

Vibrating Drive Units and/or Bowls



By supplying the basic equipment SYNTRON makes it easy for anyone with a small parts handling problem to automate their process equipment.

SYNTRON can supply drive unit and bowl as a single unit or drive unit and bowl can be purchased individually.

You engineer the orientation of feeder bowl and discharge track to meet your own specific needs.

MW 1058

Equipment of Proven Dependable Quality

Other SYNTRON Equipment

designed to increase production, cut production costs, improve products

Vibrators (bins, hoppers, chutes)
Vibratory Feeders
Vibratory Screens
Shaker Conveyors
Vibratory Elevator Feeders
Weigh Feeders
Packers and Jolters
Hopper Feeders
Lapping Machines
Rectifiers (Silicon and Selenium)
a-c to d-c Selenium Rectifier Units
Electric Heating Panels
Electric Heating Elements
Sinuated Wires
Shaft Seals
Electric Hammers
Concrete Vibrators
Paper Joggers

Our representatives will be glad to work with you in selecting the proper equipment for your operation.

Call your nearest Syntron representative

For more information write for complete catalog . . Free

SYNTRON COMPANY

341 Lexington Avenue Homer City, Pa.

CIRCLE INFORM-A-GRAM KEY NO. 120

TOOL SHOW PREVIEWS

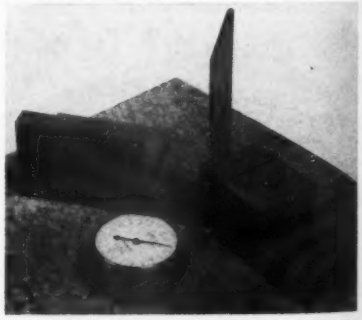
- A Brehm "Shimmy" die complete with an automatic loading and unloading arrangement will be in operation in a hydraulic press at Vulcan Tool Co.'s Booth 1404. Many different shaped parts can be trimmed with the same basic die set. Cutting adaptors only need to be changed. Thickness from 0.005" brass to ¼" steel can be handled. (S92)

- The improved Mayline 4-post steel base drafting table will be on display in Booth 1234. This table is furnished in five combinations ranging from the basic table to a table equipped with five shallow drawers. Designed by The Mayline Co., Inc., the tables are available with top sizes from 37½" x 48" through 42" x 84". (S93)

- Exhibited at Booth 2025 by Durant Tool Supply Co. will be a line of pressroom equipment. Included in the display will be Model SC-00 stock straightener, Model 3-G double roll feed, Selectromatic indexer, Model 400 scrap chopper, and Model M-I ram chopper. (S94)

- A line of precision inspection equipment will be exhibited by Collins Microflat Co. in Booth 400. Of special interest will be the lapped black granite surface plates, which eliminate seizure of gage blocks and checking fixtures and also provide a continuous bearing surface. (S95)

- A new angularity gage (pictured), a new 1" capacity dial micrometer, and a new Type B long range indicator will be introduced at Booth 227 by B. C. Ames Co. The



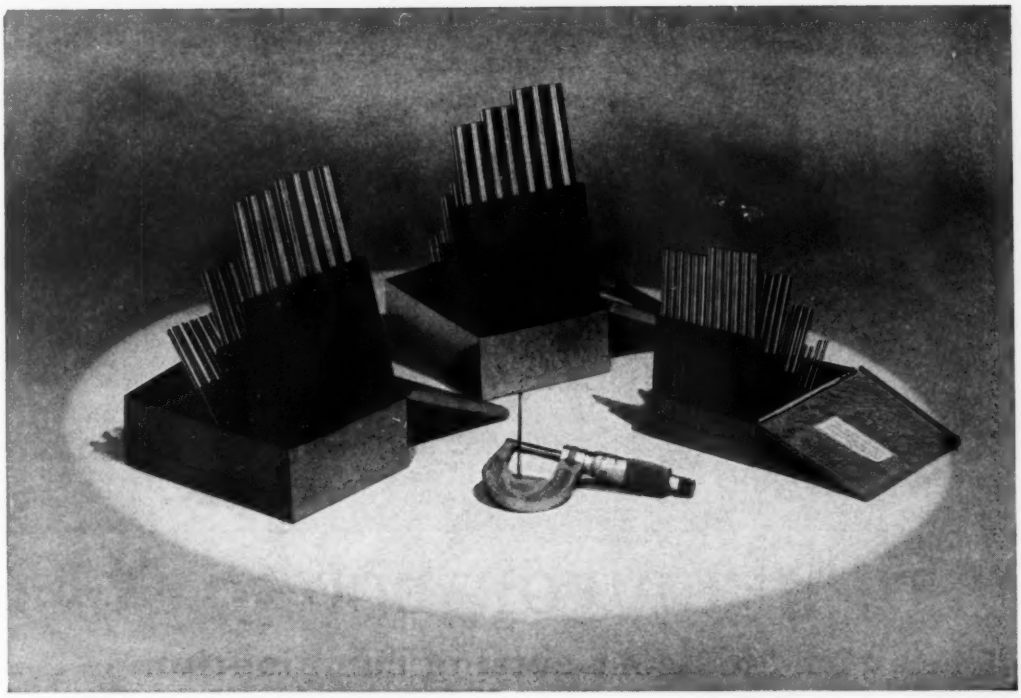
angularity gage solves the difficult problem of measuring angle degrees on compound curves, and the 1" capacity dial micrometer is designed for rugged, heavy-duty use. (S96)

DRexel 6-4222 ESTABLISHED 1927

WILLIAM T. HUTCHINSON CO.

53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" — .0000
or
+ .0000 — .0002"

JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

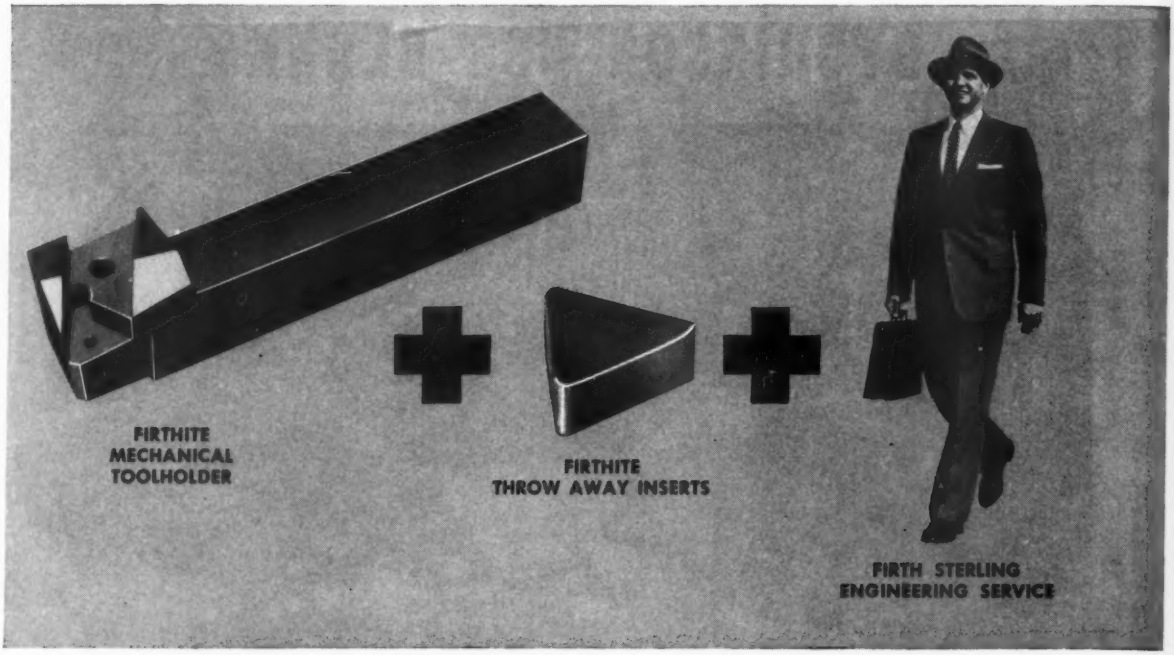
HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish. parallel ground

ANY DECIMAL DIAMETER OF STANDARD LENGTH .020" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 121

Firth Sterling ...

PIONEER IN POWDER AND MOLTEN METALLURGY



TOOL UP FOR ECONOMY

with this cost-cutting combination

There are two important reasons why thousands of metalworking plants are cutting costs with Firth Sterling mechanical toolholders, throw away inserts and engineering service. First, the broad experience and expert application knowledge of Firth Sterling engineers (yours at no cost) help you plan your tooling program for maximum savings. Second, in this complete line, Firth Sterling has toolholders and inserts—*exactly* right for *your* job:

THRIFTOOL—lowest cost toolholder made. Offers chipbreaker, rigid insert and rapid indexing for reduced set-up time.

ECONODEX—medium priced holder is ideal for jobs requiring positive rake. Carbide anvil and carbide chipbreak clamp assure long life.

MECHANIDEX—for heavy-duty machining. Adjustable chipbreaker offers extreme versatility, allowing top and bottom indexing of inserts.

FIRTHITE INSERTS—most precise dimensionally—are available in a full range of Carbide grades and the new Firthite Cermet WF Grade. *Now available for the first time, high speed steel throw away inserts in two of Firth Sterling's top cutting grades—Circle C and Van Chip.*

To get help with *your* tooling problem from a Firth Sterling engineer, simply call your nearest Firth Sterling sales office or distributor. And for further information on Firth Sterling toolholders and inserts, write for descriptive bulletin MTI-3: FIRTH STERLING, INC., Dept. 100, 3113 Forbes St., Pittsburgh 30, Pa. Offices and warehouses in principal cities.

PRODUCTS OF *Firth Sterling* METALLURGY

HIGH SPEED STEELS • TOOL & DIE STEELS • STAINLESS SPECIALTIES • HIGH TEMPERATURE ALLOYS
SINTERED TUNGSTEN CARBIDES • HEAVY METAL • CERMETS • CHROMIUM CARBIDES
ZIRCONIUM • TITANIUM • STERVAC & STERCON SUPER ALLOYS

FIRTH STERLING TRADE MARK

CIRCLE INFORM-A-GRAM KEY NO. 122

OUTSTANDING PERFORMANCE

VISIT OUR BOOTH '58 ASTE TOOL SHOW

BOOTH No. 1539

BOYAR-SCHULTZ 6 x 12 SURFACE GRINDERS

Thousands of satisfied users attest to the outstanding performance and long life of these fine machines.

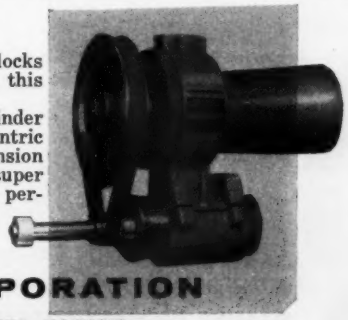
Users tell us it is **The outstanding buy in the fine machine tool field.** AND at unbelievably low cost.

HIGH SPEED GRINDING ATTACHMENT

Extends the usefulness of your surface grinder. For grinding angles or slots too small to permit using standard size wheels; for grinding T-slots and many other hard-to-get-at surfaces.

It provides higher spindle speed for grinding small radii and small contours in die blocks or other parts requiring this type of grinding.

Mounted on surface grinder spindle in minutes. Eccentric bushing provides belt tension adjustment. Pre-loaded, super precision ball bearings are permanently lubricated.



BOYAR-SCHULTZ CORPORATION

2012 SOUTH 25th AVENUE, DEPT. CM, BROADVIEW, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 123

LONGER DIE LIFE, AUTOMATIC OPERATION

THE Clearing Hi-Speed Press

A Clearing Hi-Speed Press is the combination of ruggedness and speed that you've been looking for to run progressive and high speed blanking dies. The frame is beefed up with plenty of extra steel where it counts. Square gibbing with oil lubricated bronze ways hold the slide in lasting alignment. As a result, you can trust your most expensive dies to these machines, *and get more out of them.* Bed and slide are twice as rigid as a standard press—die life increases far beyond normal expectations.

These presses are ready to go when they reach your plant—all controls and automatic equipment are in place. Installation is simply a matter of connecting the air line and electricity.

A complete line of Clearing Hi-Speed Presses is available from 50 through 200 tons. Speeds to 300 SPM. Write for bulletin.

CLEARING PRESSES

the way to efficient mass production

CLEARING MACHINE CORPORATION *division of* **U.S. INDUSTRIES, INC.**

6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 124

TOOL SHOW PREVIEWS

- Three items will be featured by Hevi-Duty Electric Co. at Booth 205. In addition to a shaker hearth furnace and an immersed

electrode salt bath furnace, the Treet-All furnace (pictured) for operation at 1850° for hardening of most tool steels, will be on display. (S97)

- Among the Firth Sterling products to be shown at Booth 202 will be a line of high speed steels, tool and die steels, and high temperature alloys. Three melting processes will be featured — air arc, consumable electrode vacuum, and induction vacuum. (S98)

- Perforators capable of replacing many drilling operations will be displayed in Booth 1821 by Durable Punch and Die Co. As a feature, Durable will operate a press which will be punching a 0.040" dia hole through steel 0.095" thick. (S99)

- Three Jacobs chucks will be on exhibition at Booth 1535. Model 91 spindle nose lathe chuck and Model 96 key type collet chuck hold 1/16" to 1 3/8" bar stock. The Albrecht heavy-duty keyless drill chuck will also be shown by The Jacobs Mfg. Co. (S100)

- Shown at Booth 1255 will be a line of Mult-O cutting tools especially designed for high-production, transfer-type operations because they combine multiple operations in single machining cuts. 19 tools ranging from 0.220" to 6.250" dia will be shown by Barber-Colman Company. (S101)

- Sunnen Service Corp. will introduce their new PG-800 precision gage and PG-400 size-setting fixture for measuring internal diameters. They will also exhibit and demonstrate precision honing equipment at Booth 1438. (S102)

- Kenplate, an adaptation of Kennametal cemented tungsten carbide that protects against abrasion and wear in hard facing metal surfaces, will be displayed by Kennametal Inc. Also to be shown at Booth 1605 are Kennametal encased Kendex boring bars which minimize deflection and chatter on precision boring operations. (S103)

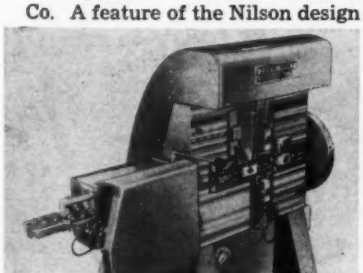
- In addition to its complete line of Erickson precision collet chucks and expanding mandrels, Erickson Tool Co. will display a new line of Quick Change tool holders and adaptors. These holders, designed to take any standard milling machine tapered adaptor, will be seen at Booth 805. (S104)

- Booth 218 will feature Engis Equipment Company's research, analytical, and production inspection instruments for checking roundness, surface finish, straightness, squareness, etc. Look for Talysurf, for measuring surfaces; Talyrond, for measuring roundness; and other projection equipment. (S105)

- The Calibore boring head and Calibore Self-Lock boring units will be shown for the first time by Beaver Tool and Engineering Co. at Booth 829. The boring units can be set to exact part dimensions away from the machine, thus decreasing cutting tool changing time. (S106)

- Milling machines and milling machine attachments will be on display at Booth 524. Index Machine Co. will show the Model Super 55 vertical mill, the Model 60 plain horizontal mill, and the Model 45 vertical mill. (S107)

- A vertical 4-slide forming machine, the V-187 Vertiform (illustrated), will be shown at Booth 1817 by The A. H. Nilson Machine Co. A feature of the Nilson design



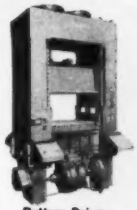
is that the actuating of the forming slides is done by incorporating a drive shaft located behind the face of the machine. (S108)

. . . *Continued on page 184*

CLEARING manufactures the right press for you

Check the press or literature in which you are interested.
Tear out the page and send it to Clearing.

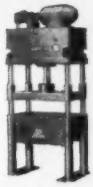
Straight Side Hydraulic

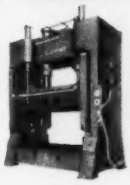

Bottom Drive Mechanical

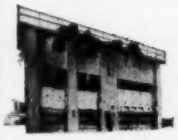
Top Drive Mechanical

O.B.I.

Gap Frame

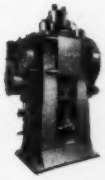

Trimming

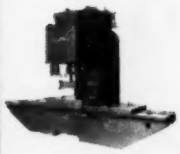

Die Spotting


Transflex Modular

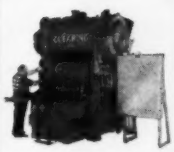
Knuckle Joint

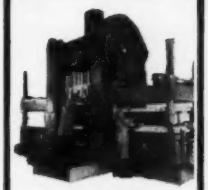
Horn

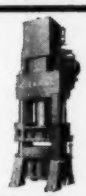

Forging


Straightening

Series-S


High Speed


Moving Bolster


Column Type Hydraulic with Rubber Pad

AND MANY MORE

BULLETINS
- ☐ Automation Accessories
- ☐ Unusual Press Applications
- ☐ Clearflo Lubrication
- ☐ Plunger Guiding
- ☐ Overload Device
- ☐ Micro-inching
- ☐ Enclosed Presses
- ☐ Cushions

CATALOGS
- ☐ Series-S Crankshaft Straight Side
- ☐ O.B.I.
- ☐ Bottom Drive
- ☐ Hydraulic
- ☐ Brochure—"New Economics of Press Automation"

MOVIES
- ☐ A Modern Fable
- ☐ Transflex—Automation In Action
- ☐ Modular Automation
- ☐ Automation Comes of Age

CLEARING PRESSES

the way to efficient mass production

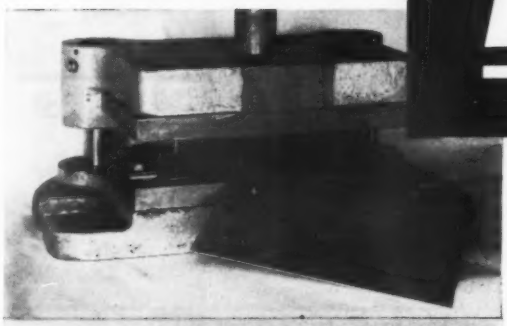
CLEARING MACHINE CORPORATION *division of U.S. INDUSTRIES, INC.*
6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 125

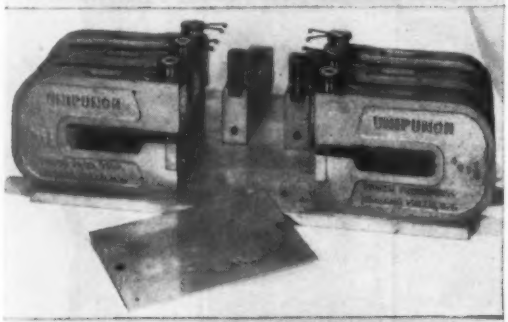
UNIPUNCH

TOOLING METHOD!

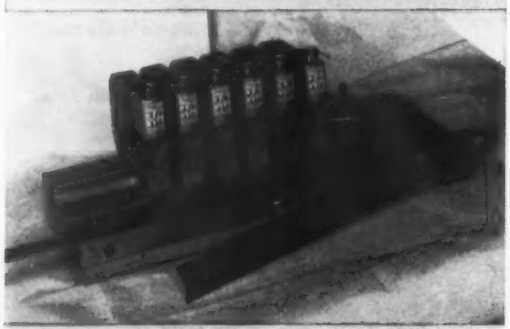
• • • IT IS



1 For cost comparison, the above custom made, single-purpose conventional die to punch 6 holes cost approximately $325.00.



2 Unipunch template set up of 6 units to punch the same six holes as the conventional die above, costs only $271.36.



3 Same 6 Unipunch Units as shown in photo No. 2 for punching 6 different diameter holes in angle requires only 6 punch bodies and 6 die buttons reducing cost of tooling second part to only $23.70. If same diameter holes were in this angle as in No. 2 work piece there would be no additional cost.

● The UNIPUNCH METHOD uses a wide range of standard interchangable units and parts to lower production costs. This method permits any number of units to be set up quickly outside the press, placed on press bed and produce finished parts with first stroke of press ram. Nothing is attached to press ram . . . down-time cut to minutes.

The same group of units may be set up in unlimited patterns keeping the tooling investment in continuous operation for greater savings. An example of these savings by the UNIPUNCH Method is shown at left. It's a great big economy story.

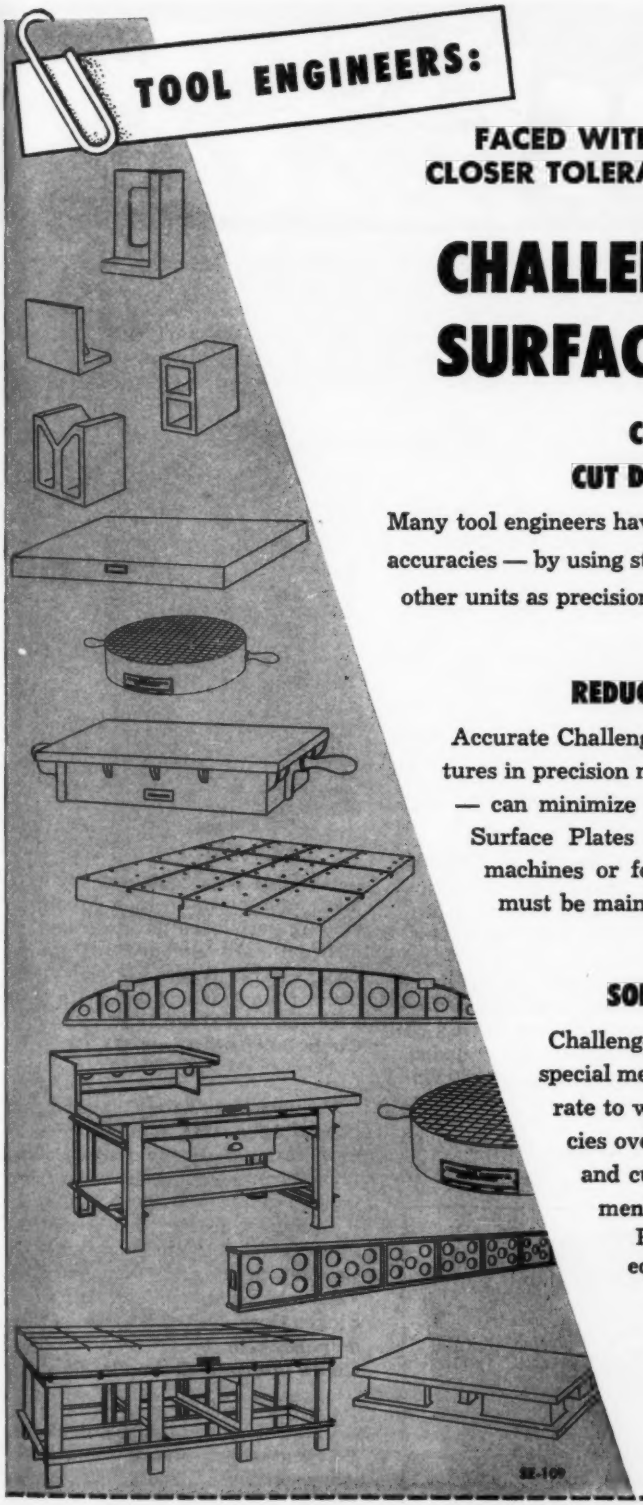
Visit our booth 1323 at the ASTE Show in Philadelphia May 1-8

Write Today ▶ for FREE Methods Book

PUNCH PRODUCTS *Corporation*

3804 HIGHLAND AVENUE, NIAGARA FALLS, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 126



TOOL ENGINEERS:

FACED WITH A PROBLEM OF HOLDING CLOSER TOLERANCES IN YOUR OPERATIONS?

CHALLENGE PRECISION SURFACE EQUIPMENT

CAN HELP YOU . . . CUT DOWN TOOLING COSTS

Many tool engineers have found they can cut tooling costs — and increase accuracies — by using standard Challenge Angle Plates, Box Parallels, and other units as precision bases for building precision jigs and fixtures.

REDUCE MANUFACTURING REJECTS

Accurate Challenge Surface Equipment — used both as holding fixtures in precision machining, or for accurate assembly and inspection — can minimize rejects . . . save manufacturing costs. Challenge Surface Plates can also be used as bases for small standard machines or for larger machine tools where precise alignment must be maintained.

SOLVE SPECIAL MEASUREMENT PROBLEMS

Challenge has supplied many types of precision surfaces for special measurement problems. Semi-steel surfaces . . . accurate to within .0002" over several feet, or to lesser accuracies over large areas . . . have been provided for standard and custom applications. If you have a special measurement problem—check Challenge first!

For a copy of our catalog of standard precision equipment write Dept. TP-4.

Challenge®

THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN

SEE THIS EQUIPMENT AND

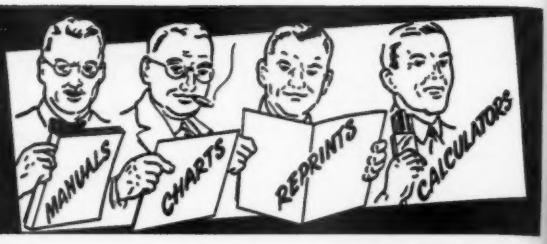
7 NEW ITEMS OF CHALLENGE PRECISION SURFACE EQUIPMENT

ON DISPLAY at the

ASTE SHOW BOOTH 1073

CIRCLE INFORM-A-GRAM KEY NO. 127

SHOP AIDS



A Chart covers both government aluminum specifications and helpful information on the bending and forming of aluminum sheet and plate. One table lists the minimum recommended bend radii for each of the popular aluminum alloys and tempers. Another table classifies the alloys by temper according to relative formability. The chart is available from Peter A. Frasse & Co., Inc., 17 Grand St., New York 13, or —
Circle Inform-A-Gram No. C1.

Seamless Mechanical Tubing Tolerance Data is presented on a chart which covers cold-drawn and hot-finished dimensional tolerances of round, seamless, carbon and alloy steel mechanical tubing in various conditions of heat treatment. This card, TDC-115D, can be obtained from Babcock & Wilcox, Beaver Falls, Pa., or —
Circle Inform-A-Gram No. C2.

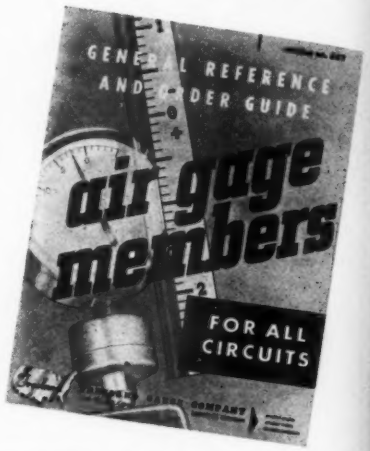
"You Benefit by Proper Compressed Air Processing" is a guide to help you make better use of compressed air power. This brochure explains the advantages such as longer air equipment performance with lower maintenance costs and longer life of air tools and air-actuated devices. C. A. Norgren Co., Englewood, Colo., will supply copies of the brochure, or —
Circle Inform-A-Gram No. C3.

Save Layout Time, eliminate detailing, and cut tooling cost using the "Standard Templates" catalog from Northwestern Tools, Inc., 116 Hollier Ave., Dayton 3. Over 200 components for jigs and fixtures, all in full scale, are presented in this catalog. Get your copy from the company, or—**Circle Inform-A-Gram No. C4.**

Selection of Offhand Belt Finishing Materials and Equipment is simplified by using an illustrated wall chart. Proper abrasives, belt speeds, lubricants, and contact wheels are listed for 16 metals and alloys. Information on 11 types of contact wheels includes types of surfaces, hardness, density, and wheel action. The 15" x 27" chart is available from Behr-Manning Co., Dept. OBF, Troy, N .Y., or —
Circle Inform-A-Gram No. C5.

A 40-Page Bulletin contains hydraulic tables and other engineering data. Bulletin 3300 furnishes conversion tables, decimal equivalents, hydraulic ram capacities, wire and sheet metal gages, steel pipe tables, etc. Data on fluid losses, properties of metal sections, and delection curves for springs is also included. Contact Hamilton Div'n, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio, or —
Circle Inform-A-Gram No. C6.

"Air Gage for All Circuits" discusses the general principles of basic air gage instrument design and engineering. Back pressure, low flow type, and the differential types of circuits are discussed. Tabular list-



ings of air gage members or "spindles" appropriate to each circuit, including parts identifications and dimensions, are included. Write for this General Reference and Order Guide from Freeland Gauge Co., 9940 Freeland Ave., Detroit 27, or —
Circle Inform-A-Gram No. C8.

Vacuum Metallizing, the process of depositing a thin metallic film by evaporation and condensation under high vacuum conditions, is described in a brochure. Without buffing or polishing it gives a bright metallic finish on almost any base material. Request copies of Catalog 780 from Vacuum Equipment Div'n, F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, or —
Circle Inform-A-Gram No. C9.

Uses of a Precision Reflecting Polygon with a Microptic autocollimater to check circular spacing accuracy of rotary tables, dividing heads, and other similar devices, are discussed in a bulletin. "Testing Circular Division with Precision Polygons" includes diagrams of this method. Write to Engis Equipment Co., 431 S. Dearborn St., Chicago 5, or—**Circle Inform-A-Gram No. C10.**

Stainless Fabrication — 386 pages of it — is completely covered in Allegheny Ludlum Steel Corp.'s brand new hard-covered handbook. More than 140 photos, 120 charts, and 200 special diagrams show how to turn versatile stainless steel into usable products. The book's nine chapters cover these subjects: cutting, joining, cold forming, hot forming, machining, heat treating, and surface treating. A copy of "Stainless Steel Fabrication" can be obtained by writing on your company letterhead to the Editor, TOOLING & PRODUCTION, 1975 Lee Rd., Cleveland 18, Ohio.
Circle Inform-A-Gram No. C7.

Acme-Gridley

JOB FACTS

Piece—Differential case cover

Material—Malleable iron casting

Operations—27 (16 on 1st operation work)—completing both ends of piece in single machine setup

Machine Time—30 seconds

Machine—8"RPA-8 Acme-Gridley Chucker arranged for double indexing

Write today for your free copy of 16-page illustrated bulletin CM-51A that shows and describes how Acme-Gridley 4, 6 and 8 spindle chucking automatics are designed to give you the maximum return on your investment.

minimizes the importance of the decimal point . . . maintains automotive quality control

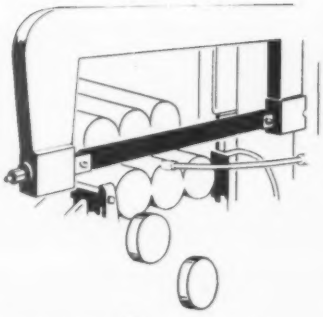
Continuous quality control, so basic to modern automobile production, was implemented by this manufacturer when he chose Acme-Gridley multiple spindle chucking automatics to perform 27 operations on the piece shown at the left. This not only let him do more operations in a single machine setup but, because of Acme-Gridley inherent design for sustained accuracy at high speeds and feeds, gave him decimal point accuracy that remained within control limits for check lot after check lot. Thus he prevents costly production bottlenecks, reduces scrap and maintains a balanced flow of parts to final assembly points.

National Acme

THE NATIONAL ACME COMPANY, 169 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES: • Newark 2, New Jersey • Chicago 6, Illinois • Detroit 27, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 129



Capewell High Speed Power Hack Saw Blades can take higher speeds and feeds for higher production and profit

3 TYPES FOR EVERY PURPOSE

TECHNITE

HIGH SPEED

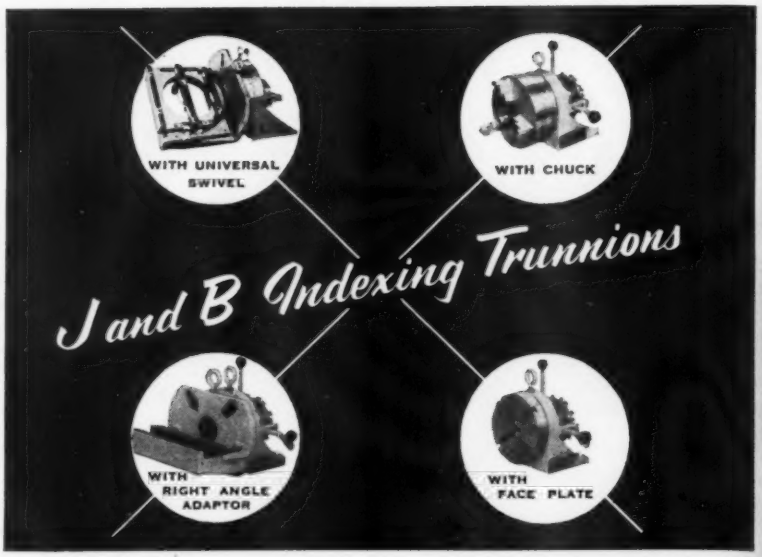
SAFETECH

See Your Capewell Distributor

CAPEWELL

THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1301



BASIC TOOLS FOR METALWORKING IN THE GUIDED MISSILE PROGRAM

Here, in a standard product with an impressive record of accuracy and long life, Johnson and Bassett offers you the means for special tooling with increased production speed and accuracy on your drilling, tapping or counterboring operations.

We are specialists in adapting these trunnions to fit specific requirements at considerable savings compared to expensive all-new machines. Already special tools built around our standard trunnions are serving the missile program. Let us show you how our products may bring speed and accuracy to your operation.

Model MT300 solved the problem of machining guided missile heads with no distortion and where odd radial angles were required.

Send for latest brochures.

J&B EST. 1870 **JOHNSON & BASSETT, INC.**
PRODUCTION TOOL DIVISION
WORCESTER MASSACHUSETTS

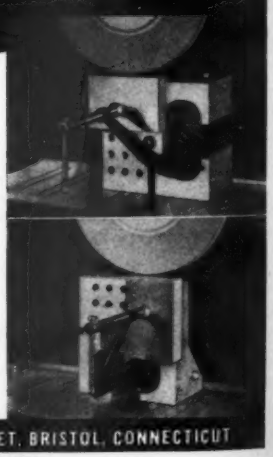
CIRCLE INFORM-A-GRAM KEY NO. 1302

NEW Federal Square Master ANGLE PLATE

Will Grind A Work Piece Square The Easy Way Without Skilled Help

Designed for grinding a work piece to exact squareness, whether it be a component of a jig, fixture, gauge, or die; eliminating an indicator, precision square, surface plate, and use of top skilled help on routine jobs. Can also be used on layout work and inspection. This precision tool is built of high grade steel, stabilized, hardened and ground. ALL WORKING SURFACES ARE GUARANTEED TO BE SQUARE within two-tenths of a thousandth . . . (.0002). Write for complete literature describing other outstanding features.

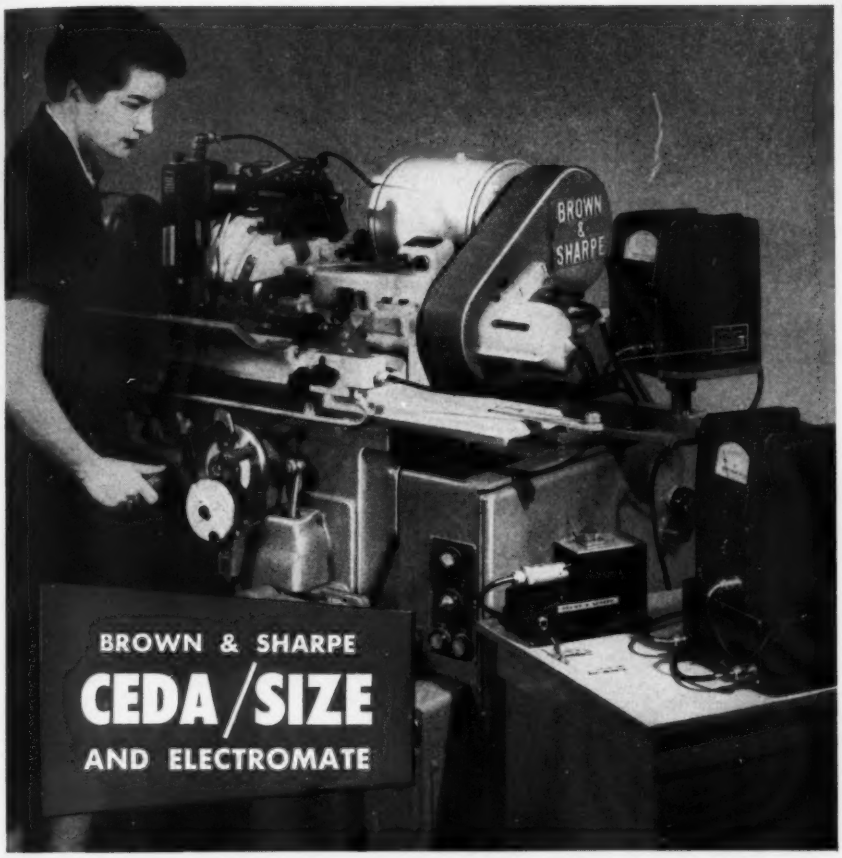
Note adjustable set edge and recess for C-clamp. →



FEDERAL MACHINE TOOL COMPANY EMMETT STREET, BRISTOL, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 1303

Grinding to ±0.000010" or less
in production – with average operators



...clearance of mating parts held to ±0.000020" or less

NOW . . . from Brown & Sharpe—comes the answer to space-age precision demands . . . the new CEDA SIZE arrangement for the No. 5 Plain Grinding Machine, and the ELECTROMATE attachment.

With electronic efficiency, CEDA SIZE saves you the extra time and exceptional skills now devoted to lapping and other methods of precision sizing. You get exact duplication, within a few millionths, on high precision parts needed for missiles, fuel injectors, instruments, etc.—on a *production* basis, with operators of limited experience.

Find out how CEDA SIZE can solve your toughest "tolerance headaches." For full information, write: Brown & Sharpe Mfg. Co., Providence, R. I.

PROGRESS IN PRECISION FOR 125 YEARS

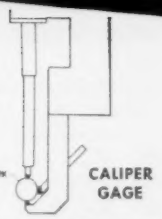
Brown & Sharpe

MILLING, GRINDING, AND SCREW MACHINES

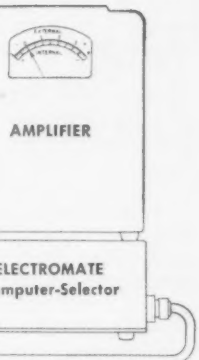
MACHINE TOOL ACCESSORIES • PRECISION TOOLS • HYDRAULICS • CUTTERS

CIRCLE INFORM-A-GRAM KEY NO. 131

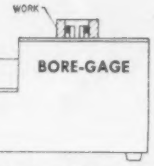
millionths for missiles



With the CEDA SIZE equipped B&S No. 5 Plain Grinding Machine, diameter readings are transmitted to Amplifier from Electronic Caliper Gage riding on work. When diameter is within about fifty millionths of finished size, CEDA SIZE lever is depressed, which produces and controls an extremely fine grinding feed. When Amplifier indicator reaches zero, the specified size has been duplicated to ±0.000010" or less.



The ELECTROMATE Computer-Selector attachment, when used with CEDA SIZE, automatically computes the differential between the internal diameter of the mating sleeve (set on Electronic Bore Gage) and the external diameter of the part being ground. When indicator reaches zero, clearance (preset with masters) has been duplicated to ±0.000020" or less.

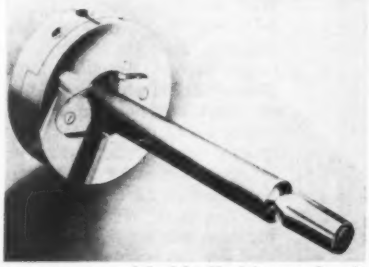


In addition to CEDA SIZE and ELECTROMATE the No. 5 Plain Grinding Machine shown is also fitted with ELECTRALIGN (upper rear amplifier) to insure easy, accurate control of taper.

PRODUCTS on PARADE

For more information about the products described here, use POSTAGE-FREE Reader Service Card in this issue.

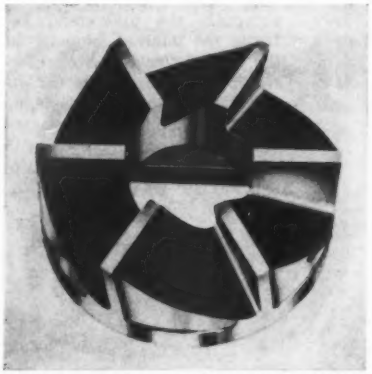
Clean Spindles, Quills, and Sockets on machine tools and drill presses with a taper chuck cleaner. The cleaner utilizes the static action of special plastic blades with the aluminum shaft, which holds the blades,



to attract and hold all chips and grit present in chucks. For literature, write to James Products Co., 801 Mentor Ave., Mentor, Ohio, or — **Circle Inform-A-Gram No. A1.**

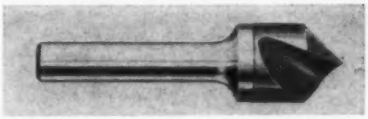
Cutting and Grinding Fluids for the metalworking industry have been announced by Keystone Lubricating Co., 3100 N. 21 St., Philadelphia 32. Including three oil-type and three water-type products, the line offers the correct lubricant-coolant for every metal-removal need. **Circle Inform-A-Gram No. A2.**

Reduce Tool Chatter and ensure smoother cuts on rough surfaces using the new improved line of back spotfacers. They are designed with a positive rake angle which makes



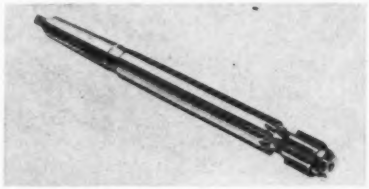
cutting easier and reduces heat when counterboring inside surfaces that cannot be machined by conventional methods. For literature, write to Metal Cutting Tools, Inc., 301 S. Water St., Rockford, Ill., or — **Circle Inform-A-Gram No. A3.**

Sink Holes Without Chatter or Tearing using the Series 1704 single flute, solid carbide cutter on a steel shank. The tools will produce finishes comparable to a ground surface, and are recommended for mild



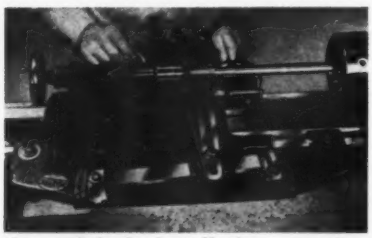
steels and all materials except hardened steels. ½", ¾", and 1" dia are available. For literature, write to Atrax Co., 240 Day St., Newington, Conn., or — **Circle No. A4.**

A Carbide Tipped Expansion Machine Reamer has a patented method of expansion which ensures rigidity, is accurately controlled, and is always uniform throughout the length



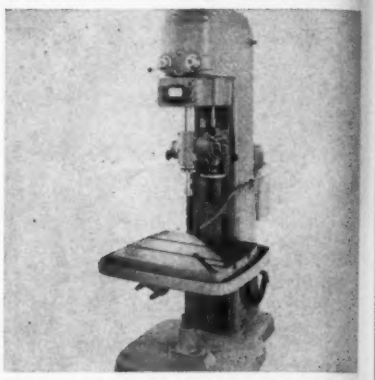
of the cutting blades. The cutting element can be replaced quickly. For information, write to Staples Tool Co., 2352 Glendale-Milford Rd., Cincinnati 16, or — **Circle No. A5.**

A Master Taper Attachment can be attached easily to equip any type lathe to perform taper turning, boring, and internal or external threading operations. The universally adaptable attachments can be attached or detached in minutes, and



the original installation requires drilling only two holes on the carriage for fastening the overarm. For literature, write to General Sales & Engineering Co., Dept. TPC, 4525 N. Clark St., Chicago 26, or — **No. A6.**

Two New Models of the Infispeed Sliding Head Drills provide infinitely variable spindle speed within the speed range of the drill. The exact speed required by drill diameter and work material may be obtained.



They are built in single and multiple spindle, floor, bench, and production box column models. For literature, write to Cincinnati Lathe and Tool Co., Cincinnati 9, or — **Circle Inform-A-Gram No. A7.**

Eliminate Multiple Handling of Non-Ferrous Metals by using adjustable storage racks. Storing and stock selection is a one man job with the overhead stacker crane, and damage to stock is reduced because materials are transported by the crane directly to the operation. Palmer-Shile Co., 16039 Fullerton, Detroit 27, or — **Circle No. A8.**

A Replacement Spindle adapts Bridgeport Milling Machines to permit use of Microbore Flash-Change tooling to reduce downtime on milling, drilling, and boring operations. The spindle is easily installed and the socket, an integral part of the spindle, combines maximum strength and

rigidity for rounding operations with extreme accuracy for precision finishing operations. DeVlieg Microbore, Div'n of DeVlieg Machine Co., 2720 West 14 Mile Rd., Royal Oak, Mich., or — **Circle No. A9.**

JONES & LAMSON OPTICAL COMPARATORS

the man who needs a new machine tool is already paying for it

Inspections formerly "Impossible" are now done at a glance

Not so very long ago, the quality control inspection of intricate parts was a mean, painstaking job. It called for a number of gages, lots of computations, a good sense of "feel" and, in many cases, sheer instinct. Even then, there was a margin for error.

Things are quite different now. Take this application, for example. The piece being inspected is a precision gear shaft. Its oil grooves, shoulder lengths and several diameters, as well as the lead, pitch diameter and thread angle of its thread and worm are *all* inspected in *one simple operation* by a Jones & Lamson Optical Comparator. And the inspection is precise, to .0001".

The speed, accuracy and versatility of J & L Comparators could very well improve *your* production. Write for our latest Comparator Catalog. JONES & LAMSON MACHINE COMPANY, 519 Clinton St., Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 133

WHY MACHINE IT?

Use FLOTRUSION*, a new and revolutionary method of cold flowing various metals into tubular forms of all shapes and sizes.

. . . meets demand for high production of parts previously requiring expensive and lengthy machining and polishing to hold dimensional tolerances and finishes.

. . . in many cases form in one piece a part formerly requiring several components.

. . . maintain the same wall thickness with smaller or larger diameters on the same tube.

. . . form cylindrical sections with heavy wall sections at one or both ends, or in the center to provide for bearings, threads, weldments, etc.

. . . require only the exact amount of material necessary to produce the parts.

. . . on heavy sections, maintain the same O.D. as the tube body, with smaller I.D., or larger O.D. with same I.D., or both.

. . . increase tensile strength and improve grain flow by cold working and eliminating heat-treating.

Lockheed PITOT MAST

The flotrusion process is readily adaptable to the construction of many diversified parts used in the missile and aircraft industries for both airborne and ground equipment.

Our staff of specialized engineers is available to show how this highly flexible process can—REDUCE COSTS, SAVE WEIGHT, and SIMPLIFY your PRODUCT.

Your inquiry is invited.

FLOTRUSION, INC.
1733 FLOWER STREET
GLENDALE 1, CALIFORNIA
A Division of DARCO INDUSTRIES, INC.

CIRCLE INFORM-A-GRAM KEY NO. 1341

NEW P.D.Q. End Mill Driver... Cuts to Size with UNDERSIZE END MILLS*

Representatives in Principal Cities

*Now you can utilize your inventory of undersize end mills and still cut to size. The new P.D.Q. end mill driver can be offset positioned by micrometer adjustment to compensate for undersize mills. In addition, the orbital offset motion increases chip clearance, insures square slots and permits milling true to centerline. One pass cutting of key ways is now possible.

The End Mill Driver has a four to one speed ratio between spindle and cutter which enables the Driver to do the work while the machine actually loafs. This new P.D.Q. tool offers a new concept in end mill cutting . . . Write for complete information.

PDQ **PORTAGE Double-Quick, Inc.**
1046 SWEITZER AVENUE • AKRON 11, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1342

DYKEM STEEL BLUE
Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.

CIRCLE INFORM-A-GRAM KEY NO. 1343

ULTRA-CHEX GAGE BLOCKS *for Every Need!*

Supplied in one Superior Accuracy
5 MILLIONTHS ± ACCURACY

34 BLOCK SET (shown) WITHOUT OPTICAL PARALLEL ... $125.00

82 BLOCK SET ..... $260.00 IN CASE

These sets will supply the needs of any discriminating shop that must work to gage-block precision. IMMEDIATE DELIVERY

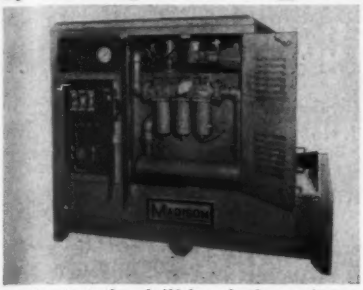
9 Block Set
For Individual Mechanic
$24.75
OPTICAL PARALLEL $6.00 Extra

WRITE FOR ILLUSTRATED FOLDER

GEO. SCHERR CO., INC.
200-T LAFAYETTE STREET • NEW YORK 12, N. Y.

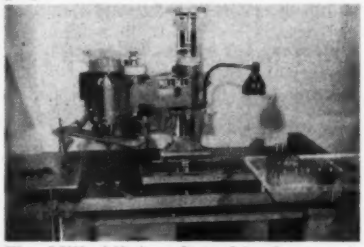
CIRCLE INFORM-A-GRAM KEY NO. 1344

A Large Capacity, High Pressure Coolant Unit permits use of gun drills on any turning machine for deep, precision drilling in one pass from the solid at high rate of feed. By delivering 40 and 60 gpms of



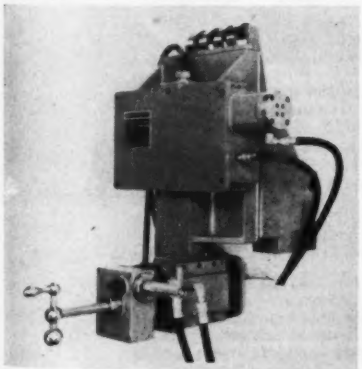
coolant at the drill head, the unit assures uninterrupted removal of chips, and low temperature for continuous drilling. For information, write to Madison Industries, Inc., Muskegon, Mich., or — **Circle A10.**

Milling, Routing, Drilling, spotfacing, and other machining operations can be performed on a pantograph controlled toolroom machine.



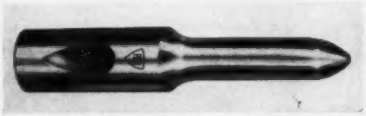
The Mill All is adaptable for work on instrument parts, castings, molds, dies, and close tolerance machined parts. Mill All, 8 E. Prospect Ave., Mt. Vernon, N. Y., or — **No. A11.**

Hydraulic Contour Wheel Dressers are designed for multiple wheel grinders and for grinding applications which cannot be handled by a single spindle grinder. Models 93 and 95 are available for left and



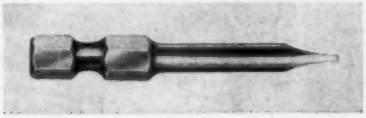
right-handed installations on cylindrical grinders. Hoglund Engineering & Mfg. Co., 343 Snyder Ave., Berkeley Hts., N. J., or — **No. A12.**

Quickly and Accurately Locate Work in a Press using standard interchangeable pilot punches that feature a radius point. They are available in 45 punch point diameters



ranging from 0.1855" to 0.871". Richard Brothers Punch Div'n, Allied Products Corp., 26500 Capitol Ave., Detroit 39, or —
Circle Inform-A-Gram No. A13.

Power Screw Driver, ¼" Hex Drive Bits for slotted screws have been announced by The Magna Driver Corp., 779 Washington St., Buffalo, N. Y. These bits are used



in power screw drivers with non-rotating finders, and are available in two grades of hardness for case hardened or soft screws.
Circle Inform-A-Gram No. A14.

Increased output from your carbide or ceramic cutting tools

HYPREZ
OSCILLATING LAPPING MACHINE

Records prove that the Hyprez lapping technique increases tool output per grind 200% to 700% — improves speed and feeds 50% to 400% — assures finer finishes and closer tolerances on end products. Now, your carbide and ceramic cutting tools and inserts can be lapped or refinished precisely and quickly.

OSCILLATING WHEELS ASSURE PRECISION

The Hyprez Finisher moves the variable-stroke lapping wheel across the edge of the tool while it is held stationary in a precisely controlled position. Protractors set exact angles for the horizontal and vertical planes; edges are straight; the geometry is not distorted. The top, lands and radii of the tool can be finished to 1 micro inch in two minutes or less.

HYPREZ DIAMOND COMPOUNDS

Charged with proper grades of Hyprez Diamond Compounds, the oscillating lapping wheels produce uniform, predictable finish—faster, scratch-free, precise.

For a demonstration or complete literature write Dept. LST-48

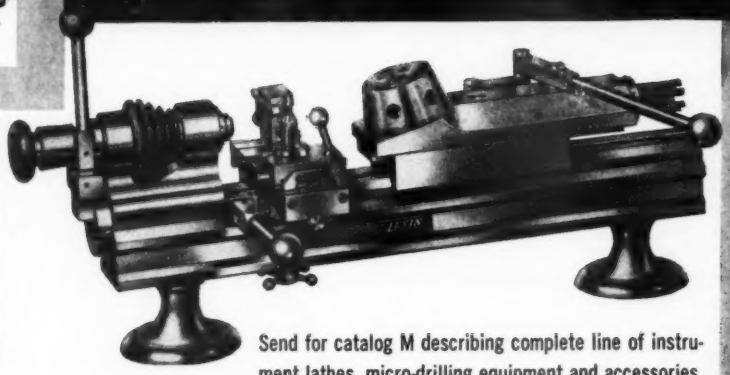
HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. DEARBORN ST., CHICAGO 5, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 135

EQUIP FOR THE SIZE OF THE JOB

LEVIN® TURRET LATHES

PRODUCE SMALL INSTRUMENT PARTS BETTER



A small precision turret lathe for second operations and production of instrument parts. Available in two collet capacities, 5/16″ or 3/16″. The 6 position turret is self indexing and has hardened ways. Turret holes are 1/2″ diameter. Turret travel 1-5/8″. The cross slide has a swivel side at one end and a rigid tool block at the other. Lever collet closer provides quick opening and closing. A variety of turret tools with 1/2″ shanks is available.

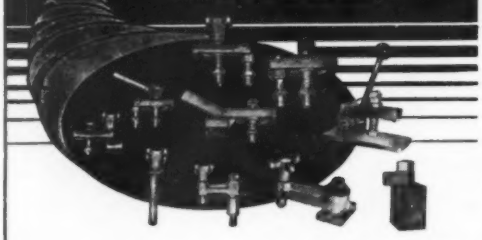
Send for catalog M describing complete line of instrument lathes, micro-drilling equipment and accessories.

Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California

CIRCLE INFORM-A-GRAM KEY NO. 1361

write to **monroe**

Engineering Products Inc.
1515 Hurd Road, Monroe, Mich.



for fully illustrated catalog with accurate full size templates of assemblies

more than 1,000 details

CIRCLE INFORM-A-GRAM KEY NO. 1362

Don't overlook these ways to cut production costs!

OK OK SLITTER KNIVES • SHEAR BLADES • BRONZE WAYS • WORK-REST BLADES • CUT-OFF BLADES • SCRAP CHOPPERS • HARDENED SPACERS • BALL RACES • HARDENED WAYS • WEAR STRIPS • GIBS

THE OHIO KNIFE CO.
CINCINNATI 23, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1363

FOR FASTER GRINDING at LOWER COST

USE **A.I.T.** Diamond Wheels for all Carbide Grinding

RESIN **B-60** Cup Type Diamond Wheel

TYPE DIIB

The exclusive B-60 Bond used in A.I.T. bonded diamond wheels has been field tested in over 400 plants. We can *prove* these superior advantages to you in YOUR plant:

- Faster grinding
- Up to 40% longer wheel life
- One grit size wheel can be used to hog and finish—for extra savings.
- Wheel grinds cooler—does not fracture carbide
- Corners stay sharper longer
- No re-dressing of diamond surface
- NEW BACKING dissipates heat faster
- No down-time for dressing inside body section

Write today for new, FREE catalog and prices

A.I.T. Diamond Tool Co.

8217 N. KIMBALL AVE.
SKOKIE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1364

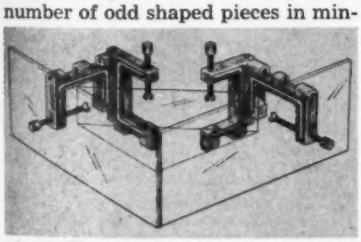
An Automatic Lead Wire Saw is capable of notching 600 28-bar commutators/hr by simultaneously cutting two lead wire slots each machine index, and will run until the

loading magazine is empty, then shut itself off. Capacity is 1½" dia and 1½" length. Motor-Mation, Inc., P. O. Box 2145, N. Canton, Ohio, or— **Circle Inform-A-Gram No. A15.**

180 "O" Rings in sizes from 1 to 25 are contained in the Universal Select-O-Ring kit No. 2. With this kit on hand, the maintenance department will always have O rings

for emergencies. There is a small gage molded into the side of the kit for instant cross-section measurement. For literature, write to Bearings, Inc., 3634 Euclid Ave., Cleveland 15, or — **Circle No. A16.**

A Pair of Clamps can be used in 9 different combinations and will easily clamp a miter or joint, and a number of odd shaped pieces in min-



utes. The third hand clamps will hold any piece of metal in any positioning for welding, fastening, and machining. Aircompco Co., Edison, N. J., or — **Circle No. A17.**

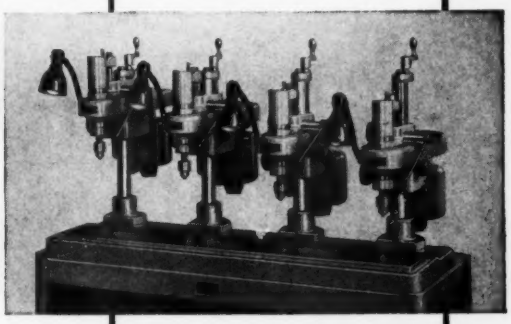
Added Bearing Surface is provided in these double margin drills with margin on the leading and trailing edge of each land. Therefore, they are useful in applications where optimum drill alignment through bushings is desired, and also for obtaining holes closer to the drill size.

Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich., or — **Circle Inform-A-Gram No. A18.**

Die Pad Retainers have a hardened retainer sleeve which absorbs normal die side thrust and greatly reduces stress on bolt threads. Large base and head diameters distribute die

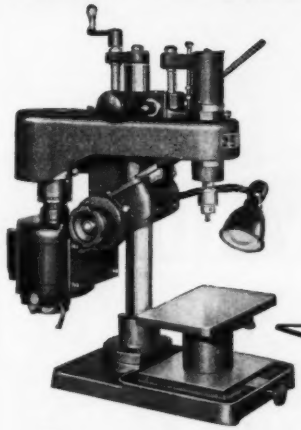
load over a greater area, permitting the use of a minimum number per die. Harco Engineering, 12092 Woodbine Ave., Detroit 39, or — **Circle Inform-A-Gram No. A19.**

HAMILTON
SUPER SENSITIVE, SMALL-HOLE
PRECISION
REPEAT
PRECISION
DRILLING MACHINES



"for the finest work you do"

SINGLE OR MULTIPLE SPINDLES • VARIOUS CAPACITIES • WIDE RANGE OF CLEARANCES • VARIABLE SPINDLE SPEEDS • COMPANION TAPPING MACHINES



Designed and built to *master* the heart-breaking jobs which are so often attempted on drilling machines of "standard" accuracy.

YOU
will want full information!
WE WILL SUPPLY IT
FREE
ask for
BULLETIN No. 2467
ADDRESS

THE HAMILTON TOOL COMPANY
832 South Ninth Street
HAMILTON, OHIO

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

2467

CIRCLE INFORM-A-GRAM KEY NO. 137

MILNE'S
"One Track Mind"
TOOL STEELS
Means Better Service
For You...

When you want the right answer in less time, it makes sense to go to a specialist. Milne's single-minded concentration on tools steels and tools only has made it America's Leading Tool Steel Specialist. For 70 years, Milne has been expanding its tool steel knowledge, its range of tool steel stocks and its nationwide network of tool steel offices and warehouses.

As a specialist, Milne keeps up-to-date on the newest special-purpose steels and is continually adding them to warehouse stocks. And, from experience, Milne knows the importance of "Rush Delivery" on a tool steel order, whether it's in pounds or tons.

Write or call your nearest Milne office for Milne's latest Tool Steel Selector Chart.

WAREHOUSES:
SALES OFFICES:
SALES AGENCIES:

Wide range of grades and sizes in
• WATER HARDENING
• NON DEFORMING • SHOCK RESISTING • GRAPHITIC
• HOT WORK AND HIGH SPEED TOOL STEELS
Complete Line of Tool Steels
Solid • Hollow
• Flat Ground

A MILNE & CO. INC

CIRCLE INFORM-A-GRAM KEY NO. 1381

ECONOMY
Your Standard for
PERFORMANCE—
PRECISION—
FIT!

A.G.D. Plug and Ring Gages
"TRU-LOC" Adjustable Adapter Sleeves and Nuts
A.S.A. Drill Jig Bushings

Complete stocks assure prompt delivery. Outworn plugs and ring gages salvaged at low cost.

Economy
TOOL & MACHINE CO.
1828 South 68th Street
MILWAUKEE 14, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1383

Smoother Production! Higher Output! Lower Costs!
RICE-MILWAUKEE

DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.
This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

PROFILE GRINDERS
. . . for high speed Precision Grinding of Curved and Irregular Contours.
Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

Write for Illustrated Bulletins and Prices

RICE PUMP & MACHINE COMPANY
228 PARK AVENUE BELGIUM WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1382

DIXON ONE-MAN
COIL GRAB
CUTS TIME AND COSTS WITH ONE-MOTION REEL LOADING

Saves labor and speeds coil handling. One man can lift, turn, and load coil with a single, easy motion. Positive grip and support eliminate coil damage, assure operator safety. Forged steel wedge separates coils easily. Standard sizes up to 15,000 lb. capacity available from stock.

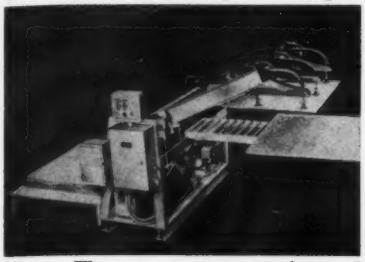
Lifts and turns in one motion.

WRITE FOR COMPLETE DATA—New bulletins illustrate standard models and show how to handle all coil sizes safely, rapidly, without damage. Write for them today.

DIXON
DIXON AUTOMATIC TOOL, INC.
2318 -23rd AVENUE
ROCKFORD, ILLINOIS
Equipment for Automatic Parts Handling and Assembly

CIRCLE INFORM-A-GRAM KEY NO. 1384

Deliver Sheets from stacks of metal and plastic to conveyors or processing equipment using an automatic overarm sheet feeder and piler. It will also remove sheets from machine tables or conveyors and pile

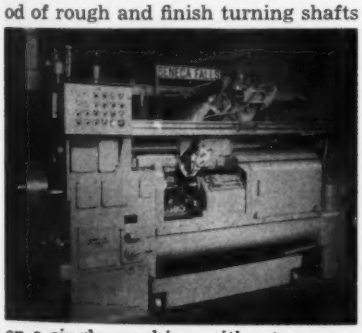


them. The vacuum-cup carrier and transfer frame is the unique feature which does the work. The de Florez Co., 116 E. 30 St., New York 16, or — **Circle Inform-A-Gram No. A20.**

Position Heavy Work Loads with accuracy to within 1/100 of an inch in vertical, longitudinal, and crosswise directions of travel by telescopic action on a boom truck. The Hydro-Boom has a capacity of 1500

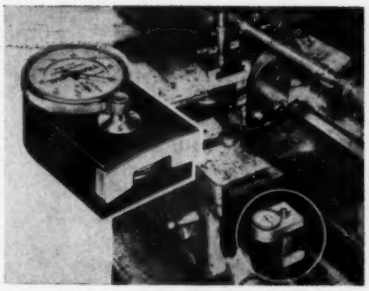
lbs maximum boom extension or 2500 lbs retracted, and can reach 48" beyond the front of the truck. For information, write to Vanguard Engineering Co., 1908 E. 66th St., Cleveland 3, or — **Circle No. A21.**

Automatic Changing of Feed Rate during the cutting cycle is possible with Models LQ and AQ lathes. These tracer lathes combine a method of rough and finish turning shafts



on a single machine without removing the workpiece from the centers between the two operations. Seneca Falls Machine Co., Seneca Falls, N. Y., or — **Circle No. A22.**

Use This Indicator with any machine tool to measure complete longitudinal travel of the machine, as well as traverse and vertical travel on certain tools. The Trav-A-Dial reads any length in 6" increments. No stops are needed on lathes for lineal measurements, and errors are eliminated on mills. For information, write to M. E. Hodge Corp., 35 N. Raymond Ave., Pasadena 1, Calif., or—**Circle Inform-A-Gram No. A23.**



PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

A PORTABLE HEIGHT-ADJUSTABLE TABLE
● TRUCK
● WORK BENCH

for
DIE TRANSFER
● MACHINE FEEDING
● ASSEMBLY AT BEST HEIGHT IN BEST LIGHT

LIFTING
● LOWERING
● TRANSPORT
of
SHEETS
PLATES
BARS
TUBES
PIPES
TOOLS
DIES
FIXTURES
●
ALL COMPACT HEAVY LOADS

UNOBSTRUCTED PERIMETER
●
WORK FROM ANY SIDE

MORE SERVICE for LESS MONEY than ANY Other Unit of Equipment

43 table surfaces
point support

Recent changes and additions to the line provide greater capacities, new flexibility, *many bonus features.*

Write for NEW, FREE Bulletin P-5604

Address THE HAMILTON TOOL COMPANY,
832 South Ninth Street, Hamilton, Ohio

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

5604

CIRCLE INFORM-A-GRAM KEY NO. 139

MILNE'S "One Track Mind"

TOOL STEELS

Means Better Service For You...

When you want the right answer in less time, it makes sense to go to a specialist. Milne's single-minded concentration on tools steels *and tools steels only* has made it *America's Leading Tool Steel Specialist.* For 70 years, Milne has been expanding its tool steel knowledge, its range of tool steel stocks and its nationwide network of tool steel offices and warehouses.

As a specialist, Milne keeps up-to-date on the newest special-purpose steels and is continually adding them to warehouse stocks.

And, from experience, Milne knows the importance of "Rush Delivery" on a tool steel order, whether it's in pounds or tons.

Write or call your nearest Milne office for Milne's latest Tool Steel Selector Chart.

WAREHOUSES: Boston • New Britain • Kenilworth, N. J. (New York) • Philadelphia • Pittsburgh • Cleveland • Dayton • Detroit • Belmont Park, Ill. (Chicago) • St. Louis • Atlanta • San Francisco • Los Angeles.

SALES OFFICES: Rochester, N. Y. • Canton, Ohio • Indianapolis • Louisville • Milwaukee • Charlotte, N. C. • Phoenix, Ariz.

SALES AGENCIES: Maxwell Steel Co., Inc. ——— Fort Worth, Texas Terrell Industrial Supply Company—Huntington, W. Va. (In Canada) Sanderson-Newbould Ltd.—Montreal-Toronto

Wide range of grades and sizes in • WATER HARDENING • NON DEFORMING • SHOCK RESISTING • GRAPHITIC • OIL HARDENING • HIGH SPEED TOOL STEELS

Complete Line of Tool Steels ... Solid • Hollow • Flat Ground

A. MILNE & CO., INC.

Established 1867—Incorporated 1937

General Offices: 67 W. 44th St., N. Y. 36, N. Y.

America's Leading Tool Steel Specialists

Complete Line of Tool Steels—HOLLOW and SOLID

AB-48

CIRCLE INFORM-A-GRAM KEY NO. 1381

ECONOMY

Your Standard for PERFORMANCE— PRECISION— FIT!

A.G.D. Plug and Ring Gages

"TRU-LOC" Adjustable Adapter Sleeves and Nuts

A.S.A. Drill Jig Bushings

Complete stocks assure prompt delivery. Outworn plugs and ring gages salvaged at low cost.

Economy TOOL & MACHINE CO.

1828 South 68th Street MILWAUKEE 14, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1383

Smoother Production! Higher Output! Lower Costs!

RICE-MILWAUKEE

DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

PROFILE GRINDERS

. . . for high speed Precision Grinding of Curved and Irregular Contours.

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

Write for Illustrated Bulletins and Prices

RICE PUMP & MACHINE COMPANY

228 PARK AVENUE BELGIUM, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1382

DIXON ONE-MAN COIL GRAB CUTS TIME AND COSTS WITH ONE-MOTION REEL LOADING

Saves labor and speeds coil handling. One man can lift, turn, and load coil with a single, easy motion. Positive grip and support eliminate coil damage, assure operator safety. Forged steel wedge separates coils easily. Standard sizes up to 15,000 lb. capacity available from stock.

Lifts and turns in one motion.

WRITE FOR COMPLETE DATA—New bulletins illustrate standard models and show how to handle all coil sizes safely, rapidly, without damage. Write for them today.

DIXON

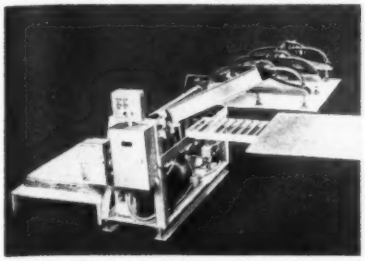
DIXON AUTOMATIC TOOL, Inc.

2318 - 23rd AVENUE ROCKFORD, ILLINOIS

Equipment for Automatic Parts Handling and Assembly

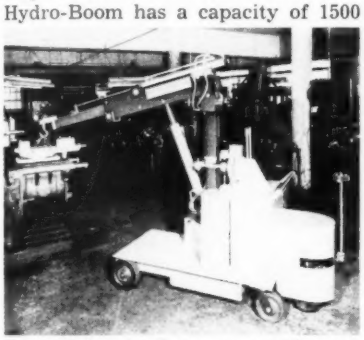
CIRCLE INFORM-A-GRAM KEY NO. 1384

Deliver Sheets from stacks of metal and plastic to conveyors or processing equipment using an automatic overarm sheet feeder and piler. It will also remove sheets from machine tables or conveyors and pile



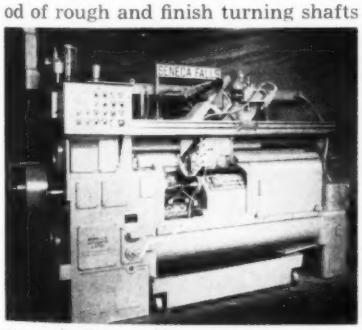
them. The vacuum-cup carrier and transfer frame is the unique feature which does the work. The de Florez Co., 116 E. 30 St., New York 16, or — **Circle Inform-A-Gram No. A20.**

Position Heavy Work Loads with accuracy to within 1/100 of an inch in vertical, longitudinal, and crosswise directions of travel by telescopic action on a boom truck. The Hydro-Boom has a capacity of 1500



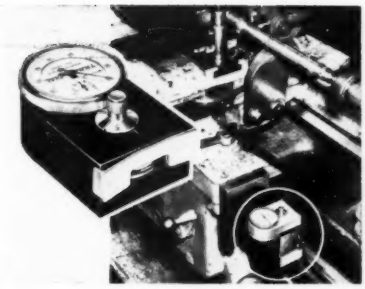
lbs maximum boom extension or 2500 lbs retracted, and can reach 48" beyond the front of the truck. For information, write to Vanguard Engineering Co., 1908 E. 66th St., Cleveland 3, or — **Circle No. A21.**

Automatic Changing of Feed Rate during the cutting cycle is possible with Models LQ and AQ lathes. These tracer lathes combine a method of rough and finish turning shafts



on a single machine without removing the workpiece from the centers between the two operations. Seneca Falls Machine Co., Seneca Falls, N. Y., or — **Circle No. A22.**

Use This Indicator with any machine tool to measure complete longitudinal travel of the machine, as well as traverse and vertical travel on certain tools. The Trav-A-Dial reads any length in 6" increments. No stops are needed on lathes for lineal measurements, and errors are eliminated on mills. For information, write to M. E. Hodge Corp., 35 N. Raymond Ave., Pasadena 1, Calif., or—**Circle Inform-A-Gram No. A23.**



PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

A PORTABLE HEIGHT-ADJUSTABLE TABLE
● TRUCK
● WORK BENCH

for
DIE TRANSFER
● MACHINE FEEDING
● ASSEMBLY AT BEST HEIGHT IN BEST LIGHT

LIFTING
● LOWERING
● TRANSPORT
of
SHEETS
PLATES
BARS
TUBES
PIPES
TOOLS
DIES
FIXTURES
● ALL COMPACT HEAVY LOADS

UNOBSTRUCTED PERIMETER
●
WORK FROM ANY SIDE

MORE SERVICE for LESS MONEY than ANY Other Unit of Equipment

43 table surfaces
point support

LIFT LOWER TRANSPORT

FOUR-WHEEL and SIX-WHEEL MODELS

Recent changes and additions to the line provide greater capacities, new flexibility, *many bonus features*.

Write for NEW, FREE Bulletin P-5604

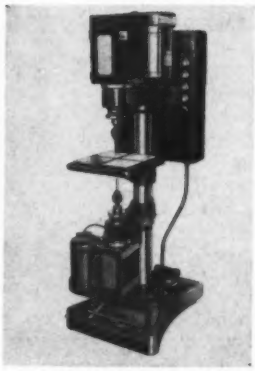
Address THE HAMILTON TOOL COMPANY,
832 South Ninth Street, Hamilton, Ohio

IT'S A Hamilton Tool!
USE IT WITH CONFIDENCE

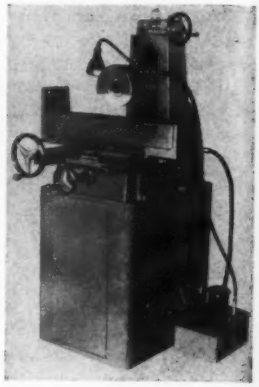
5604

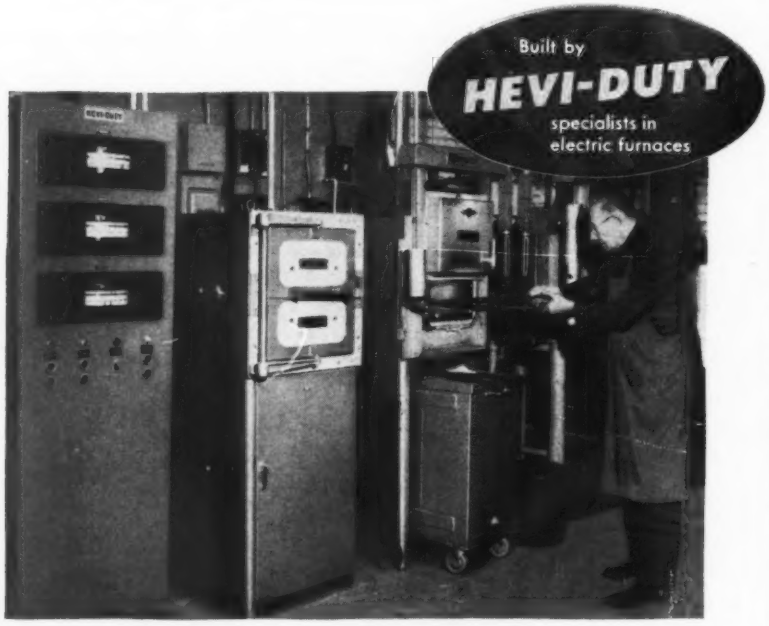
CIRCLE INFORM-A-GRAM KEY NO. 139

Deburring, Chamfering, Spot Facing, drilling and/or tapping, and reaming, are possible individually, simultaneously, or in sequence with an automatic machine. It can be used with a small index table, manual or air clamp fixtures, and hopper or vibration feed. R. E. Ellis Engineering Co., 5001 W. Fullerton Ave., Chicago 39, or — **Circle No. A24.**



Large Fine Tolerance Grinding as well as very small intricate work can be handled by the 4" x 8" precision hand feed surface grinder. A feature of Model LG-812 is the transverse slide which travels on double vee ways and has a maximum capacity of 9". For information, write to Harvey Mfg. Co., 408 St. Paul St., Rochester 3, N. Y., or — **Circle No. A25.**





"Perfection in Heat Treatment" with this HEVI-DUTY TOOL ROOM COMBINATION

Bert Morton, Tool Room Foreman of Sargent & Company in New Haven, Connecticut, says, "Our dies have to stand up in production runs of 100,000 and more and we find our Hevi-Duty Tool Room Combination gives us the perfection in heat treatment we need."

Sargent & Company performs all heat-treating operations necessary for tools, dies, punches, special fixtures and cutters made from the complete range of tool steels such as cobalt, high chromium and carbon alloys, with outstanding success in this Hevi-Duty tool room setup.

The compact group consists of a "Treet-All" furnace, temperatures to 1850°F.; "Hi-Treet" furnace, temperatures to 2500°F.; "Temperite" furnace, temperatures to 1350°F.; and an "Atmo-Gen" atmosphere generator.

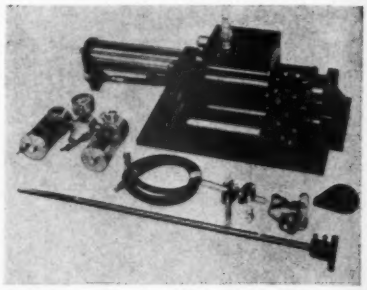
Write for bulletins 1147 A-B-C-E for complete information.

- Heat Processing Furnaces
- Dry Type Transformers
- Constant Current Regulators

HEVI-DUTY ELECTRIC CO.
Milwaukee 1, Wisconsin

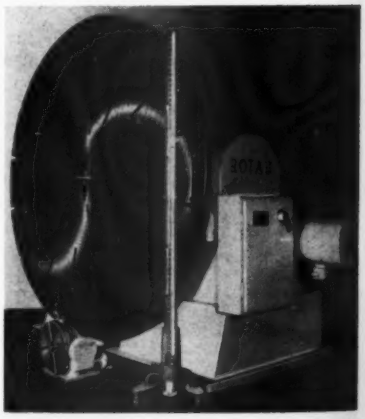
CIRCLE INFORM-A-GRAM KEY NO. 140

A Medium Duty Open Throat Air Slide Feed has an improved rugged design for automatic operation of mechanical and hydraulic stamping



presses. It can also be used as a feed to power shears, power brakes, four slide machines, and welders. For information, write to Cooper Weymouth, Inc., Stratford, Conn., or **Circle Inform-A-Gram No. A26.**

Tiltable Rotary Tables are accurate within 5 sec of arc, because an optical measuring system is incorporated into the design of the Rotabs. The micro-meter microscope



with glass vernier reticle permits direct reading for radial position on a graduated ring. Sizes are available up to 84". For literature, write to Machine Products Corp., 6771 E. McNicholas Rd., Detroit 12, or — **Circle Inform-A-Gram No. A27.**

IMPORTANT

INFORMATION ON

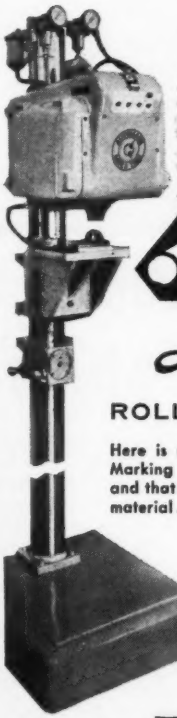
hydraulic remote controls for **throttle** and **clutch mechanisms!**

This newest bulletin is packed with important data! Sperry Hydraulic Remote Controls are available in standard and special types for use with feed, valve, throttle, governor, variable speed and clutch controls.

Send for your copy today. Just clip this ad to your letterhead, give your name and title, and mail to:

Sperry **SPERRY PRODUCTS, INC.**
404 Shelter Rock Road, Danbury, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1411



Now! MARK
FLAT, ROUND, CONTOURED SURFACES *at* HIGH SPEEDS!

MARKS ANY SHAPE

WITH *Automark*
(MODEL HRMA)
ROLL MARKING MACHINE

Here is speed, versatility and adaptability in a Marking Machine that operates by air pressure and that is controlled electrically. Marks any shape material ... round, flat or contoured.

CUTS PRODUCTION COSTS...
GREATLY INCREASES OUTPUT

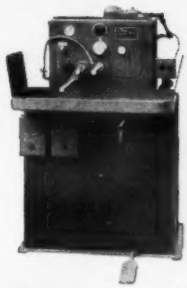
The Automark operates at speeds up to 6,000 or more 1-inch strokes per hour, or 1,400 strokes per hour on stroke of ram and die slide combination. Think of all the saving in time and money with Automarks in your shop!

AUTOMATIC FEEDS *and* FIXTURES MAY BE SUPPLIED...

SEND FOR BULLETIN ▶ **DEFIANCE MACHINE & TOOL CO.**
1922 S. VANDEVENTER DEPT. PT ST. LOUIS 10, MO.

CIRCLE INFORM-A-GRAM KEY NO. 1412

Cut Honing Costs
with Superior Honing machines!
They Outperform All Others.



MODEL "HM" HONEMASTER

SHORTEN HONING TIME

Sharpen up your production schedule with Superior Honing machines.

ACHIEVE A BETTER FINISH

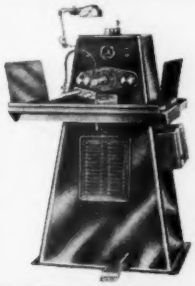
than ever before on most types of metals, hard or soft.

MODEL "VA" VERTICAL HONING MACHINE

REALIZE MUCH LONGER STONE LIFE

Superior has just the right stone for every operation.

MODEL "AL" HONING MACHINE



BENCH-TYPE MODEL "JCP"

Send today to Honing Headquarters for FREE CATALOG *and prices.*

Superior Hone Corp.

1619 Elreno Street
Elkhart, Indiana

CIRCLE INFORM-A-GRAM KEY NO. 1413

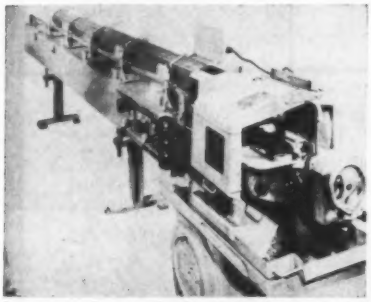
Cut and Straighten Wire ranging in diameter from 1/16" to 5/16" employing the Shuster 2AV variable speed automatic wire straightening and cutting machine. The straightening

arbor is of the high speed type, with five elongated split-dies mounted on ball bearings for minimum vibration. Mettler Machine Tool, Inc., Adeline and Boulevard, New Haven, Conn., or—**Circle Inform-A-Gram No. A28.**

Rapidly Mark Any Flat Surface for Precision Drilling with the Micro-Punch. After positioning the surface to be marked, the trigger is squeezed,

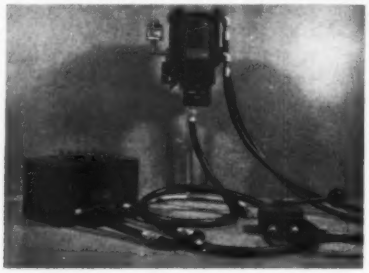
releasing the hammer which punches the intersection without jarring or recoiling. Moran Instrument Corp., 170 E. Orange Grove Ave., Pasadena, Calif., or — **Circle No. A29.**

A Modified Automatic Magazine Loading Bar Feed provides diversified application and greater efficiency of performance. Contact of bar at stock stop is controlled, elimination of bending of small diameter



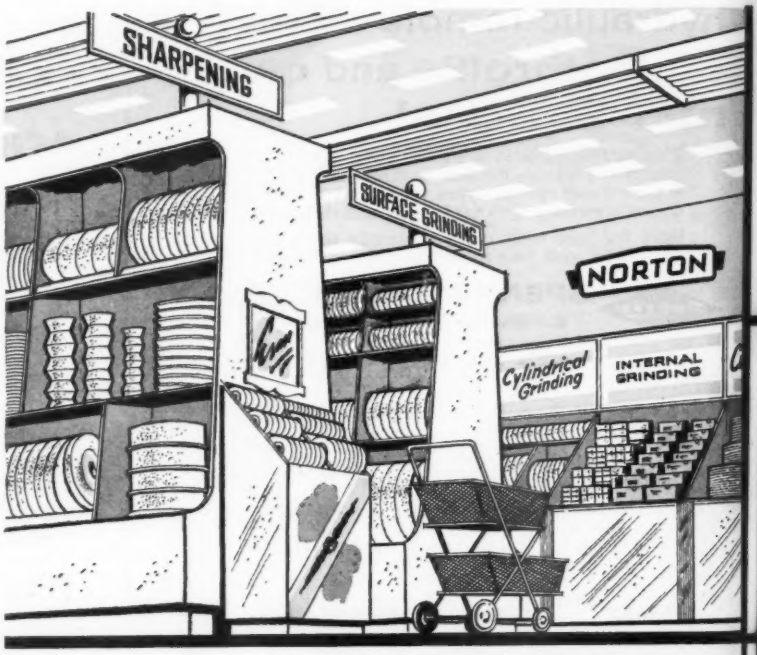
brass rods, and closer tolerance of workpiece length are possible with the adjustable hydraulic check feature. Lipe-Rollway Corp., Syracuse, N. Y., or — **Circle No. A30.**

A Multi-Vise is an air-operated hydraulic fixture, used primarily for holding parts of various diameters



and lengths securely and accurately while performing a milling operation. The standard model has a 3/4" dia capacity and the special model 1 3/8" capacity. Multi Engineering Co., 1829 N. 32nd Ave., Melrose Park, Ill., or—**Circle Inform-A-Gram No. A31.**

An Automatic Method for Stopping Stock at the proper index during strip or coil fed stamping operations is provided with a line of die stops. They are equipped with brackets that permit mounting on

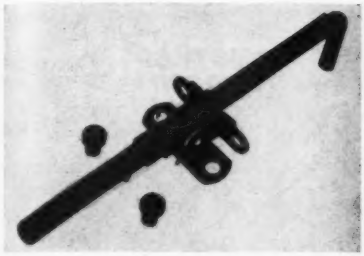


Here's your SUPER-MARKET for tool room grinding wheels

Norton makes wheels for every tool room job . . . precision-built for "Touch of Gold" uniformity

"*Everything under one roof*" is the modern super-market advantage you get with Norton wheels — the world's largest line, with exactly the right wheel for every tool room grinding job you do.

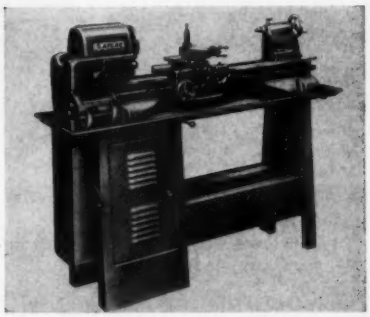
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries



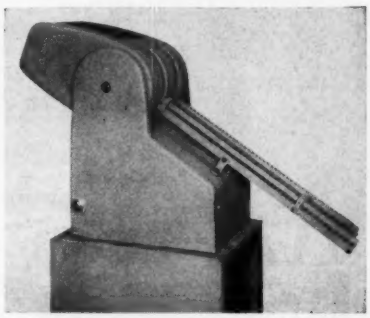
either the top or front of a die and come in three sizes, 3/16" x 5", 1/4" x 6", and 3/8" x 9". Danly Machine Specialities, Inc., 2100 S. Laramie Ave., Chicago 50, or — **Circle A32.**

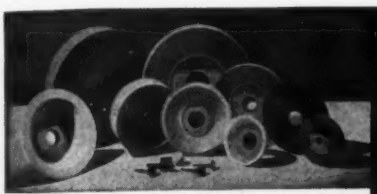
Precision Flatness of 0.0000116" is possible with a low cost maintenance lapping machine. Model 10 Lapmaster refaces mechanical seals, valve seats, compressor discs, fuel injector parts, etc. This lapping machine does not have to be stopped for redressing or trueing the lap plate. Crane Packing Co., Dept. TPC, 6400 Oakton St., Morton Grove, Ill., or — **Circle Inform-A-Gram No. A33.**

Ruggedness, Accuracy, and Power are features of the new T Atlas 12" general purpose lathes. Other features include 16 spindle speeds, complete V-belt drive, power cross and longitudinal feeds, and wide feed and thread cutting ranges. Atlas Press Co., 22115 N. Pitcher St., Kalamazoo, Mich., or — **Circle No. A34.**

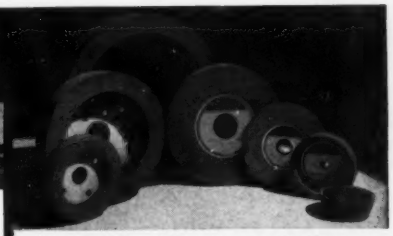


Automatic Feeding of Small Production Parts is possible with the Hopperal. It uses an oscillating motion and selectively arranges bolts, nuts, screws, nails, rivets, and other types of small fasteners and parts. Hopperal can be adapted to standard machines or integrated with specialized ones. Haberstump-Harris, Inc., 10463 Northlawn Ave., Detroit 4, or **Circle Inform-A-Gram No. A35.**





Norton G Bond and BE Bond Wheels bring you the most efficient vitrified bonds ever developed for precision and semi-precision grinding. For sharpening and for surface, cylindrical and internal grinding on all steels and cast alloys use G Bond or BE Bond Wheels in 32 ALUNDUM®, 38 ALUNDUM, 19 ALUNDUM, or the new non-premium priced 44 ALUNDUM abrasive.



Norton K Bond Wheels in CRYSTOLON® abrasive are often the best investment for many carbide grinding jobs. The vitrified K Bond comes in half-grade increments of hardness, enabling you to "pin-point" your specifications.

Norton Diamond Wheels for carbide grinding are backed by long leadership in diamond wheel development and manufacture. The regular B resinoid bond is ideal for wet grinding — the B6 resinoid bond for dry grinding.

Booklets That Tell You All. *A Handbook on Tool Room Grinding* is over 200 pages long and crammed with facts it will help you to know. *How To Select Wheels For Precision Grinding Tool And Constructional Steels* shows the way to correct wheel selection. Get these from your Norton Distributor or write to the nearest District Office of Norton Company, Worcester 6, Massachusetts.

W-1760

Norton wheels are precision processed to duplicate wheel balance and structure with precise uniformity.

To you, this means wheel after wheel and lot after lot will grind alike — with the same time-and-money-saving "Touch of Gold" performance.

And remember: only Norton offers you such long experience in both grinding wheels and grinding machines to help you produce more at lower cost. For aid in wheel selection and helpful booklets on tool room operations, see your Norton Distributor. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated. **For the booklets or other information write to Norton Company, Worcester 6, Massachusetts.**

NORTON
ABRASIVES
Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes

CIRCLE INFORM-A-GRAM KEY NO. 143

Your Inform-A-Gram Card Follows Page 166 In This Issue. It Is For Your Convenience In Making Inquiry About Advertised Products Or Editorial Items.

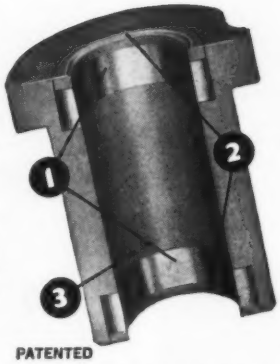
MEYCO CARBIDE INSERTED DRILL JIG BUSHINGS PROVE THEMSELVES

IN Automation !

The reason is simple: these unique bushings are ideally suited for long-running, uninterrupted operations!

MEYCO carbide inserted bushings assure long life for drills, jigs, fixtures . . . accurate work maintained, resulting in less down-time, fewer lost man-hours. Last almost as long as solid carbide bushings, cost slightly more than ordinary bushings. Get the full story:

Write for information and price list, ask for Catalog No. 41.



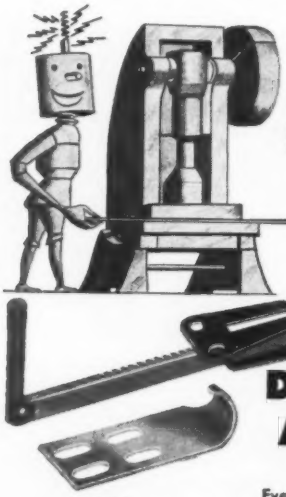
PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

EST. 1888

W. F. MEYERS CO., INC., BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1441



Let this automatic
STOCK FEED STOP
cut your labor bill!

DAHLSTROM AUTOSTOP
for punch press dies

$1.75 each

★ SPEEDS PRODUCTION
★ CUTS WASTE
★ INCREASES PROFITS

Every stroke is a production stroke when your press is equipped with the amazingly simple *Dahlstrom Autostop!* It's been tested and proven in years of actual use. Adjustable to work with *blanking, progressive or compound dies.* Mounts on stripper plate in 15 minutes—handles sheet steel up to ½" x 6" or equivalent weight. Lots of 12 or more, $1.50 each. Indicate compound or progressive dies.

Write for complete line bulletin describing Autostop, Tap Guides and Tap Chucks.

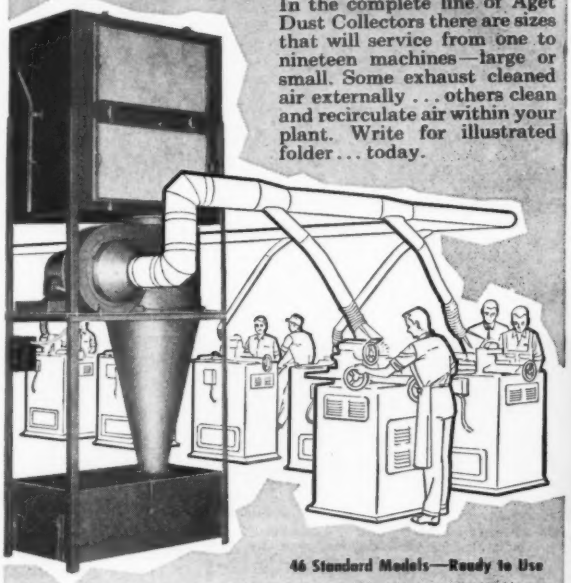
BRANCH MANUFACTURING CO. 16 Olson Drive • North Branch, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1442

just **ONE** DUSTKOP STOPS DUST

heavy duty unit services up to 19 MACHINES

In the complete line of Aget Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.



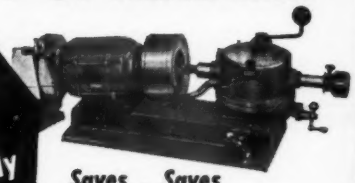
46 Standard Models—Ready to Use

AGET manufacturing company
1394 Church Street • Adrian, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1443

Super MULTI-SPIRAL END MILL GRINDING FIXTURE

SHARPENS END MILLS Quickly... Completely IN YOUR OWN SHOP

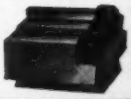


Saves Time • Saves Money

For grinding or milling of any spiral lead. Pays for itself in a hurry. Send for facts today.

SPIRAL SPECIAL CUTTING TOOLS
Cut Operations 75% or More!

Custom-designed, precision made, exactly to fit your needs. Boost both output and quality. Ask for details.



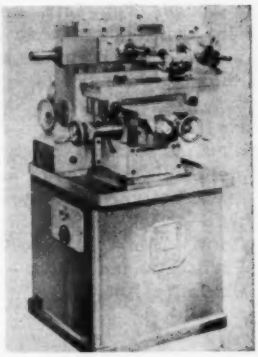
SPIRAL STEP TOOL COMPANY

Designers and Manufacturers of All Types of Special Cutting Tools
5400 N. Damen Ave. • Chicago 25, Ill.
Phone: LOngbeach 1-5384

CIRCLE INFORM-A-GRAM KEY NO. 1444

Irregularly Shaped Machine or Weldment Parts can be cut from steel plate by a new flame cutting machine. It is mostly used for cutting steel plate from ¼" thick to 2" thick at average cutting rates of 24"/min to 10"/min respectively. Speedi-Burn Products Co., Inc., 534 Linden St., W. Hempstead, N. Y., or — **Circle No. A36.**

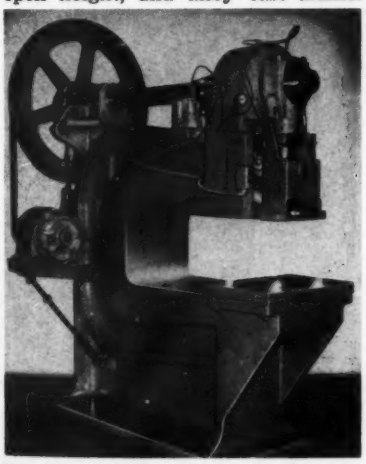
A Universal Shaping Machine is equipped to produce contours of all kinds, and surfaces and punches with curved necks. The Model K-15 employs a large, dividing head with automatic circular feed, permitting the automatic machining of radii and angles. For literature, write to Jersey Mfg. Co., 456 Livingston St., Elizabeth, N. J., or — **Circle No. A39.**



Quick, Accurate Setting of the Swivel Table on Landis precision cylindrical grinders is possible with the Miro-Swivel. The amplification

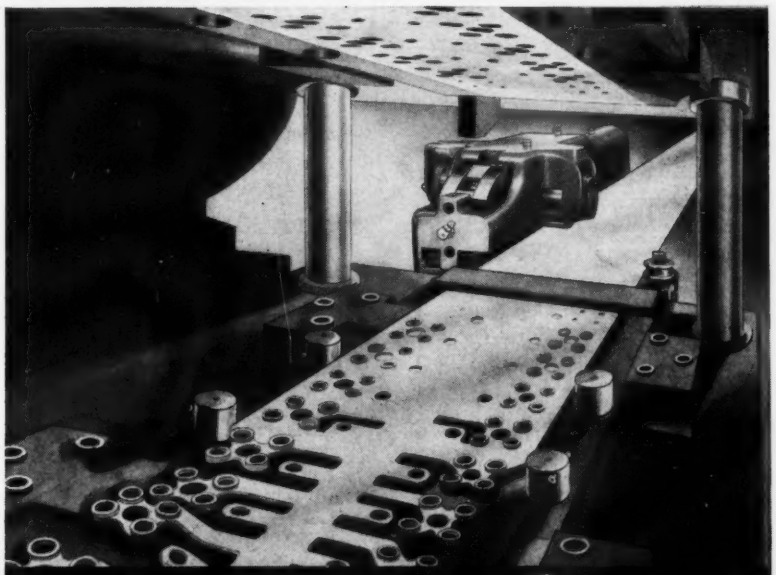
unit magnifies movements of the swivel table, and the movements are registered on a large gage. It can also be used for checking work diameters. Landis Tool Co., Waynesboro, Pa., or — **Circle No. A37.**

A Heavy-Duty Deep Throat Press with end flywheel has a 36" depth of throat, a 4" diameter shaft at pin bearing, 24" x 16" bed area and 14" open height, and alloy cast frame.

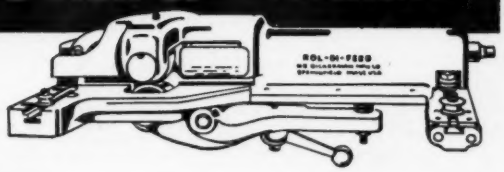


The Model 15M, 45-ton press is available in plain and geared models and with pin or air clutch. The Perkins Machine Co., Warren, Mass., or — **Circle Inform-A-Gram No. A38.**

Dickerman Feeds *Present...*



A Press-Eye View of Precision!



Hour after hour, day after day, Dickerman Press Feeds feed more presses, for more production, more profits!

A standard "off-the-shelf" feed, at a fraction of the cost of special feeds, can solve the problem of speed, accuracy and dependability and pay for itself in days. Every one of the 14 models is press-room proved on thousands of different and unusual applications.

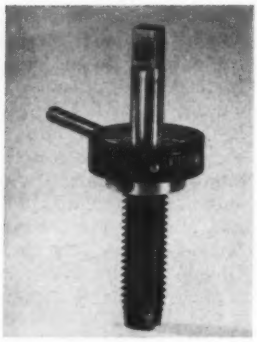
Dickerman

H. E. DICKERMAN MFG. CO.
321-414 Albany St. • Springfield, Mass.

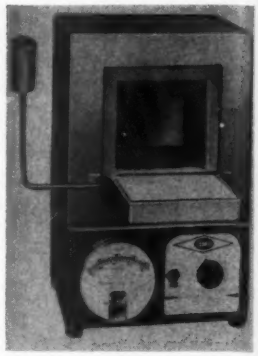
Send for information on the complete Dickerman "standard" Press Feed line — experience unlimited versatility.

CIRCLE INFORM-A-GRAM KEY NO. 145

Longer Tap Life, better size control, smoother and more accurate threads, and efficient removal of chips are possible with Skilco coolant applicator and chip ejector. It can be easily installed on hand fed or automatic tapping equipment with a set screw. Sealol Corp., Warwick Industrial Park, Providence 5, or — **Circle No. A40.**



Laboratory Testing and Experimentation for process control, and small-unit heat-treating in the plant, can be done with the Type 1300 Temco furnaces. Quick heating and even distribution is provided by the uniform spacing of the element wire throughout the plate. Thermo Electric Mfg. Co., 474 Huff St., Dubuque, Iowa, or — **Circle No. A41.**



GALVANIZE with Z. R. C.®

TO STOP RUST!

ANY SURFACE • ANY SIZE • ANYWHERE

Z.R.C. is a free flowing compound consisting of 95% pure zinc; easily applied by brush or spray; dries quickly to form a tough, flexible, firmly adherent coating. Comes in a single container — no special mixing or surface preparation necessary. Protection starts immediately and lasts — Z.R.C. WILL WITHSTAND OVER 3000 HOURS OF SALT SPRAY TESTING!

IN PRODUCTION — Z.R.C. galvanizing of parts or finished products WILL CUT COSTS UP TO 75%.— MAKE GALVANIZING A SELF-CONTAINED OPERATION!

IN MAINTENANCE — Coat with Z.R.C. instead of paint — get long-lasting, effective galvanic protection for all iron, steel and aluminum surfaces (new or old) FOR ABOUT 1½¢ per sq. ft.

O.E.M. AND MAINTENANCE USERS REPORT . . . .

Chemical manufacturer "Z.R.C. has solved a vital corrosion problem for us". Manufacturer of paper making equipment "100% effective in preventing rust and rust creepage in outdoor storage areas". Shipbuilder "Like Z.R.C. very much — can heartily recommend . . . ." Marine maintenance "Definitely recommend as an excellent product". Public utility "Superb —no sign of rust". Air conditioning apparatus manufacturer "Is doing an excellent job". Structural steel contractor (bridge) "After a year and a half—without additional maintenance—your Z.R.C. is 100% intact, no sign of corrosion".

The names of these nationally known organizations are available on request.

In maintenance, new construction or O.E.M. — Z.R.C. is the answer to rust and rust creepage problems.

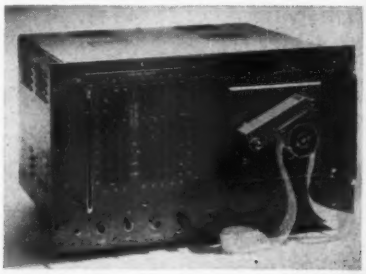
For prices, ordering information, full details . . . .

the SEALUBE company

9 Valley Street, Wakefield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 146

Program Automatic Machinery and Manufacturing Equipment with the new Tape-Ard reader which provides 80 bits of control information for each operation. A standard 1"



perforated paper tape programs and handles the fixed sequence of data. For information, write to California Technical Industries, Div'n of Textron, Inc., Old Country Rd., Belmont, Calif., or — **Circle No. A42.**

Protect Presses Against Dangerous Overloads through the press cycle by using the Bliss-Crary press tonnage Limitor, an electromagnetic torque limiting device. The Limitor func-

tions as a protective kickout by disengaging the crankshaft from the flywheel and drive when work tonnage exceeds the pre-set limit. It is also effective at any point in the press stroke. For literature, write to E. W. Bliss Co., Canton, Ohio, or — **Circle Inform-A-Gram No. A43.**

CONTRACT TOOLING AND PRODUCTION

Illinois

DRESEL-BETZ CO.
Belleville, Ill.
Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

Michigan

DAVIS TOOL and ENGINEERING CO.
19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery. Sheet Metal Stampings and Assemblies.

Ohio

CLEVELAND UNIVERSAL JIG COMPANY
13404 St. Clair Ave., Cleveland, Ohio.
MU 1-2600
DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
Production Engineering
Complete Plant Routing and Tooling

GENERAL DIE & TOOL CO.
2067 W. 55th St., Cleveland, Ohio
WO 1-4736
Dies, Tools, Jigs, Fixtures, Light Stampings, Special Machinery Manufacturing.

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, Ohio. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, Bedford 2-2800. Tooling, Short Run Production and Machined Parts for Automation.

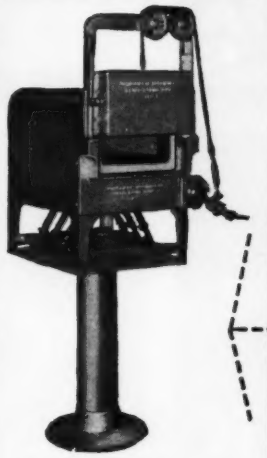
Pennsylvania

MEDAL MANUFACTURING CO.
328 Vine St., Sharon, Pa. Machined parts, complete machine assemblies, special machinery. Send us your prints for quotes.

JIG BORING
and
Large Precision Machining
Done to your specifications
We Have
22 Jig Borers

KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1471



No. 706 Pedestal $340.00
Bench Model $314.00
No. 654 — smaller version, 4 burners, 5" by 7¾" by 13½" Firebox.
Pedestal $191.00
Bench Model $165.00
(All prices F.O.B. Factory)

johnson
If it burns gas look to Johnson . . . Since 1901

VERSATILE
johnson
NO. 706 FURNACE

For hardening, tempering and annealing steels

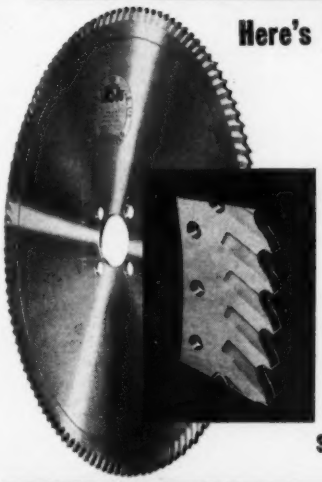
Six, No. 5 Type A Bunsen Burners give this versatile furnace a 400° to 1800° F. range. Temperatures easily controlled. Ratchet-operated door opens upwards. Use with natural, artificial, mixed or bottled gas. Economical and efficient with all. Firebox 7" by 13" by 16½". 78,000 BTU's per hour. (Natural gas)

Write for FREE Johnson catalog

JOHNSON GAS APPLIANCE COMPANY
575 E Ave., N.W.
Cedar Rapids, Iowa

CIRCLE INFORM-A-GRAM KEY NO. 1472

INSTO SAWS COST LESS NEW THAN RESEGMENTING OLD BLADES!



Here's Amazing Metal Cutting Savings!

Finest quality segmental saw blades carefully crafted by the world's largest saw blade producer and priced so low you can actually buy a new blade for less than you can resegment an old one. Insto Blades feature tungsten high speed steel segments of unsurpassed quality and narrow kerf for fast clean square cut without material distortion. Insto Segmental Saws are shipped from Cleveland stock in sizes 11" through 72" for ferrous and nonferrous applications. Save time, money, production delays, repair costs — write for details today!

Send For Free Wall Chart, Catalog and Prices
(Some Dealer Territories Now Available)

ERNEST F. *Donley's* SONS, INC.

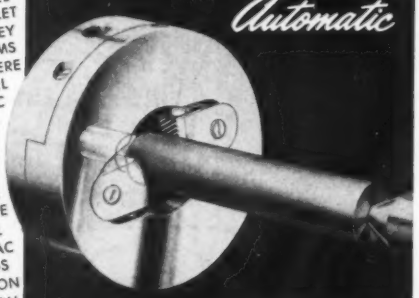
DEPT. TP-4 • 10203 MILES AVENUE • CLEVELAND 5, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1473

USED BY INDUSTRIAL LEADERS

LUFKIN FOUNDRY
GENERAL ELECTRIC
JOHNSON MOTORS
FAIRMONT STEEL
ALCO CHEVROLET
PRATT & WHITNEY
REMINGTON ARMS
FORD JOHN DEERE
BETHLEHEM STEEL
LELAND ELECTRIC
INGERSOL RAND
J. I. CASE CO.
RHEIM MOTORS
WESTINGHOUSE
INTERNATIONAL
CUMMINS ENGINE
DETROIT DIESEL
BENDIX PONTIAC
HYATT BEARINGS
CADILLAC ALLISON
CHRYSLER NORTON
LANDIS TOOL
LODGE & SHIPLEY
WAUKESHA MOTORS
SARGEANT & CO.
CHELSEA PRODUCTS
MASTER ELECTRIC
NEW PROCESS GEAR
DANA MONARCH
GOULD PUMP

SENECA FALLS Automatic



WORK DRIVER

DRIVES ANYTHING BETWEEN CENTERS

NEW JAWS with angular serrations . . .
SELF-ADJUSTING to work eccentricity . . .
PREVENTS strain on head center . . .
SAFER—no projecting parts to injure operator . .
FASTER—saves time, one operator can attend several machines. Models for all machines. Sizes for ¼" to 6⅞" work diameter; Priced from $81. Write for Bulletin D-57 for complete information.

SENECA FALLS MACHINE

BETTER TOOLING SINCE 1864 **SENECA FALLS MACHINE CO.**
Seneca Falls, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1481

Prompt Service on RAYMOND Chrome Vanadium

DIE SPRINGS

Stock or Special Sizes
Medium, Medium-Heavy, Heavy Duty

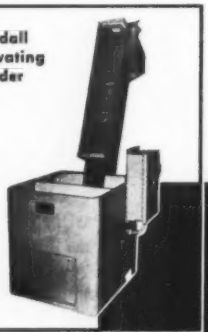
Distributed by leading die set manufacturers

Wide variety of hole and rod sizes, lengths, deflections. Increased fatigue life. Reduced down time. *Write for specifications and price list, and name of nearest distributor.*

Raymond Manufacturing Division
Associated Spring Corporation
Corry, Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 1483

Feedall Elevating Feeder



Feed high-speed production machines automatically with

FEEDALL AUTOMATIC PARTS FEEDERS

YOU NAME the part and the flow rate...a Feedall machine will provide high-speed delivery, feed or transfer of small parts in a fully automatic operation. Versatile Feedalls handle rolling or sliding parts, valve slugs, rings, bars up to 1½" x 30" long, and scores of other high-production pieces.

TYPICAL USES include hopper-load elevating, blade or rotary feeders for centerless grinders, presses, milling machines, heat-treat machines and similar production units.

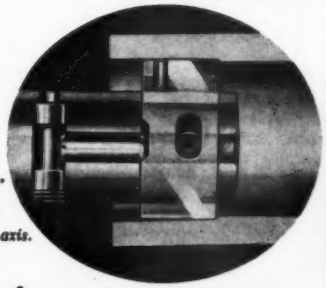
DETAILS are contained in latest Feedall catalog, complete with estimate data sheet. Write for your copy today.

Feedall — *Producers of automatic feeding devices*
FEEDALL, INC. • WILLOUGHBY, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1482

THIS SPECIAL FLOATING MOUNT...

Bores More Accurately, Makes Smoother Finishes!



Notice how the blade "floats" laterally, centers itself to the bore axis.

Clark ADJUSTABLE FINISHING BARS with Cam-Lock Floating Mount
(Also available in types for rough boring)

Here's the bar that automatically corrects for misalignment between turret and spindle! The double-lipped blade floats in the bar, centers itself to the spindle axis! Chip load is equalized between cutting lips. Result... smoother, faster finishing; accurate diameters from end to end!

Exclusive Clark Cam-Lock permits instant removal of blades for resetting *without disturbing the set-up!* Micrometer adjustment varies blade diameter. Available in M-3 H.S.S. or carbide tipped. Sizes ⅝" to 6" I.D. Others on special order. *Write for data!*

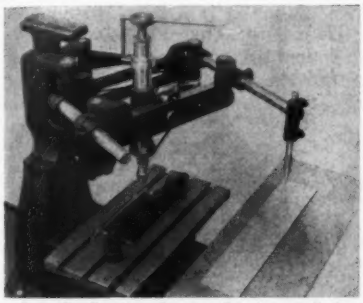
Robert H. Clark Company
9330 Santa Monica Blvd., Beverly Hills, California

CIRCLE INFORM-A-GRAM KEY NO. 1484

Prevent Any Power Source from being thrown on while men are working the line, by using the multiple safety Lock-Out. The two-piece unit is ideal for time switches, transformer houses, switch fuse boxes, safety valves, etc. Dayton Rogers Mfg. Co., Minneapolis 7, or —
Circle No. A44.

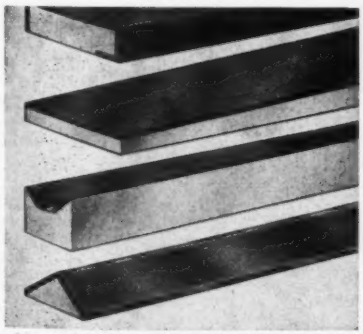
Forming, Trimming and Force-Fit Assembly Operations can be done with high-speed bench presses. The new models bring high ram speeds and adjustable down-stroke control to the small hydraulic press field, as well as large die casting producers. For literature, write to Machinery Div'n, Hannifin Co., Des Plaines, Ill., or **Circle No. A47.**

Drill Any Number of Holes from an accurate master template using the quick-action drill attachment for the Model UE-3 Panto engraver. It is particularly useful for drilling printed circuit units used in electri-



cal and electronic products, and for drilling, engraving, and profiling in carbon, plastic, and metal plates. H. P. Preis Engraving Machine Co., 284 Industrial Branch, U. S. Highway 22, Hillside, N. J., or —
Circle Inform-A-Gram No. A45.

Hardened Standard Ways are practically wear proof. The hardness uniform to the full depth of tool steel along the entire length almost eliminates galling or scoring. The ways can be used as wear plates, slides,



etc., and are available in bar lengths or cut to special sizes. The Ohio Knife Co., Dept. LL-75, Cincinnati 23, or —
Circle Inform-A-Gram No. A46.

SEE US AT BOOTH 1423
A. S. T. E. SHOW

T-J CUTTERS

assure higher production precision die sinking!

The facts speak for themselves when more and more metal-working engineers are finding that T-J Cutters assure precision accuracy, and high production die sinking. T-J Cutters are extra sturdy too . . . for longer life . . . reduced die costs . . . more profits for you.

Specially designed and precision manufactured for speed, accuracy and long life, T-J's complete cutter line means less breakage . . . more work between grinds. Made from the finest tool steels available . . . properly machined . . . scientifically heat-treated and accurately ground. Send for catalog No. 1057 for information of T-J's wide range of styles and sizes. The Tomkins-Johnson Co., Jackson, Mich.

We Invite Your Inquiries on Special Cutters Too!

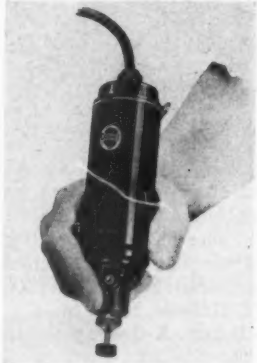
T-J TOMKINS-JOHNSON

CIRCLE INFORM-A-GRAM KEY NO. 149

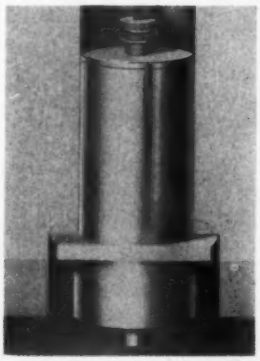
50% More Work Area for the operator and handling of more types of work are said to be possible with the series of new chain-driven dial feed presses, driven by a center-guided, timing chain. The presses will be produced in eight sizes with capacities ranging from 6 to 80 tons. For literature, write to The Federal Press Co., Elkhart, Ind., or — **Circle Inform-A-Gram No. A48.**

A Rotary Surface Grinder is suited to small work grinding operations on a high production or job-lot basis. Model 161 grinds flat, convex, or concave work surfaces up to 6" OD. A feature is the hydraulic control of operating cycle, and the machine will accommodate a wide range of small work. For information, write to The Heald Machine Co., Worcester 6, Mass., or — **Circle No. A49.**

Handy for Fast Precision Grinding, drilling, polishing, burring, etc. is the No. 2 Moto-Tool. Because it is only 6" and weighs only 13 lbs, it permits working in close quarters. Dremel Mfg. Co., 2100 18 St., Racine, Wis., or — **Circle No. A50.**



Fast, Positive Control and Removal of ferrous metal scrap is provided by the Hold-Kick-Off magnet. Magnetism is used to hold the metal and power a controlled strike-off. Four models are available. Machine Tool Electric Corp., 706 Sheridan St., Lansing, Mich., or — **Circle No. A51.**



First COMPLETE LINE OF STANDARD END MILLS for ALUMINUM

Again **PUTNAM LEADS . . .**

For further information on Putnam End Mills for Aluminum, write for Catalog 457.

Standard End Mills . . . For the first time you can select from a complete line of **standard** end mills designed specifically for milling aluminum . . . Putnam stocks 185 **standard** types and sizes.

New Designs . . . These **standard** end mills have been developed through years of research and experience on aluminum applications. Over two years ago, Putnam introduced the first **standard** end mills designed for milling of aluminum. Today, no other manufacturer offers as complete a line of **standard** end mills for aluminum.

Contact your Putnam Distributor for personalized service, quick delivery of the finest standard end mills for aluminum.

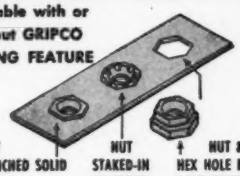
PUTNAM TOOL COMPANY
2981 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 150

For "fixed" fastenings or "hard-to-reach" assemblies

USE
GRIPCO CLINCH NUTS

Available with or without GRIPCO LOCKING FEATURE



NUT CLINCHED SOLID — NUT STAKED-IN TO FLOAT — NUT & HEX HOLE BEFORE CLINCHING

For positive attaching of a threaded medium to thin metals. They are clinched solid for a rigid application, or staked in with a six point staking punch for a floating effect.Can be automatically fed and clinched. Gripco Clinch Nuts can be clinched or staked with hydraulic or air equipment. Large inventories carried for immediate shipment. Full details available—write for samples and NEW CATALOG today.

GRIP NUT COMPANY
107 Maple Ave.
South Whitley, Ind.

CIRCLE INFORM-A-GRAM KEY NO. 1511

Leitz OPTICAL JIG BORER

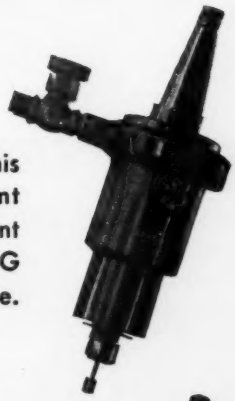
- Capacity of co-ordinate table 6" x 6"
- Setting from master glass scales in .00005"
- Setting of rotary table in 10 seconds
- Spindle head tilts for oblique holes up to 15° from vertical

Request new 8-page catalog 82-4T

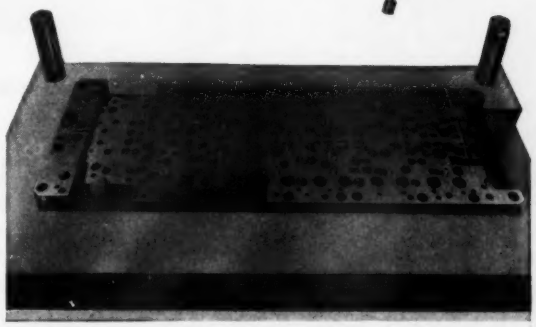
OPTO-METRIC TOOLS, INC.
137 TPVARICK STREET, NEW YORK 13, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1512

HOLES JIG GROUND with *Vulcanaire*



Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.



A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

*Vulcanaire equipment pays for itself on the first job.

Borrow our instructive 11 minute movie on Jig Grinding.

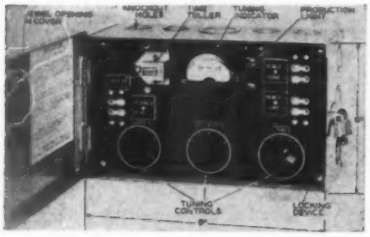
SERVICES OF YOUR TOOL ROOM IN DAYTON
ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG GRINDERS • MOTORIZED ROTARY TABLES • BREHM "SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL COMPANY
741 Lorain Ave., Dayton 10, Ohio

VULCAN tools

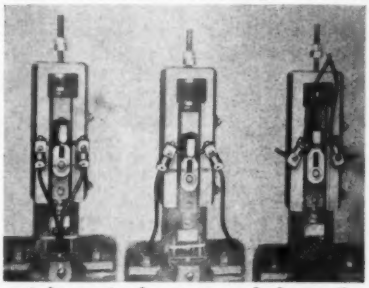
CIRCLE INFORM-A-GRAM KEY NO. 1513

A Production Time Recorder is designed especially for measuring just the actual productive time of industrial machines. Model LH Time Teller can be applied on all industrial machines regardless of size, function, or type of power. For information, write to The Moses Electronics Co., 330 Locust St., Hartford, Conn., or — **Circle No. A52.**

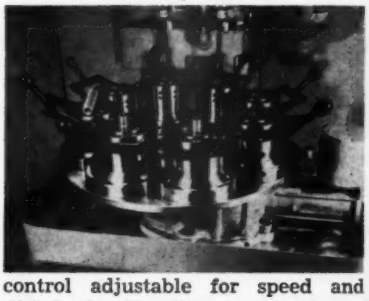


Tough Drilling Applications where conventional high speed drills cannot be used because of red heat, are ideal for cobalt high speed drills. Work hardened stainless steels, hardened laminated safe steels, and silicon chrome and certain chrome nickel alloy steels can be worked by this drill. For literature, write to Chicago Latrobe, 411 W. Ontario St., Chicago 10, or — **Circle No. A53.**

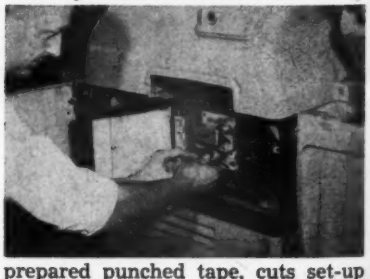
A Press Guard insures sweep action protection of operator's hands with every press stroke. Easily installed, the arms are adjustable and can be easily bent to sweep over the entire tool when necessary. It does not have to be removed from the press for set-up, because the arms can be snapped out of the way. For literature, write to Norwood Findings Co., Manson Ave., Providence 7, or—**Circle Inform-A-Gram No. A54.**



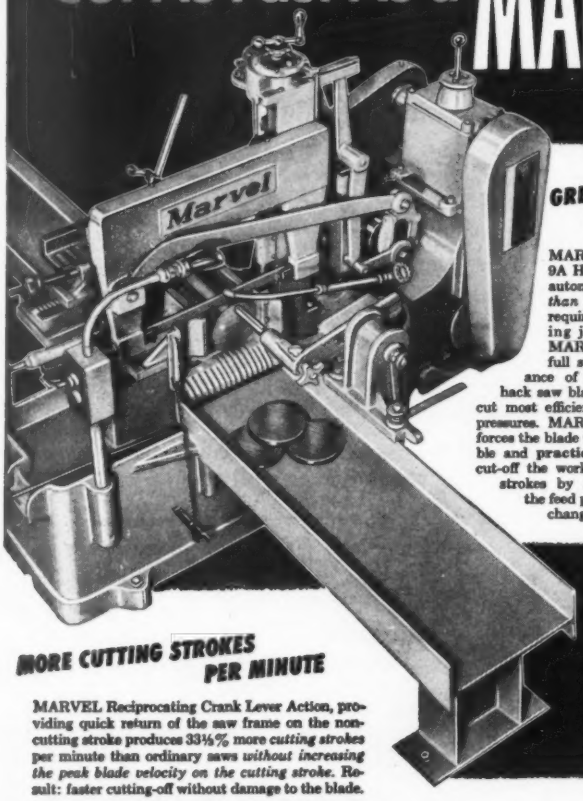
A New Fast-Indexing Unit, with 330-lb dial, indexes 90° with a smooth, shockless operation in as little as 7/10 sec, and uses a new control adjustable for speed and dial load. For literature, write to Kaufman Mfg. Co., Manitowoc, Wis., or—**Circle Inform-A-Gram No. A55.**



A Tape Control is now optional equipment for most models of P&J automatic turret lathes. The equipment, by controlling all machine motions by means of data on an easily prepared punched tape, cuts set-up time and assures faster machining. Potter & Johnson Co., Pawtucket, R. I., or — **Circle No. A56.**



How Can Any Hack Saw Cut As Fast As a MARVEL?



GREATER EFFECTIVE FEED PRESSURE

MARVEL Series 6, 6A, 9 and 9A Hack Saws are capable of automatically applying *more than twice the feed pressure* required for most hack sawing jobs. This means that MARVEL Saws can utilize the full strength and heat resistance of the modern composite hack saw blade which is designed to cut most efficiently under heavier feed pressures. MARVEL Dual Power Feed forces the blade to cut as deeply as possible and practical on every stroke—to cut-off the work in the fewest possible strokes by automatically adjusting the feed pressure in relation to the changing work resistance.

MORE CUTTING STROKES PER MINUTE

MARVEL Reciprocating Crank Lever Action, providing quick return of the saw frame on the non-cutting stroke produces 33⅓% more *cutting strokes* per minute than ordinary saws *without increasing the peak blade velocity on the cutting stroke.* Result: faster cutting-off without damage to the blade.

With far greater feed pressures automatically available, plus more cutting strokes per minute, is it any wonder that MARVEL Series 6 and 9 Hack Saws will give you faster, accurate cutting-off every time?

Write for the MARVEL Catalog and the complete story on MARVEL Metal Cutting Saws

ARMSTRONG-BLUM MFG. CO.
5700 BLOOMINGDALE AVE. • CHICAGO 39, ILLINOIS

Metal Cutting MARVEL SAWS
Better Machines—Better Blades

76-1301

CIRCLE INFORM-A-GRAM KEY NO. 152

for as little as $22.00 COMPLETE IN U.S.A.

For This Production Boosting

"TRICO-MIST" COOLANT SYSTEM

With Flexible Armored Coolant Lines And Kwik-Change Nozzle.

For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers — single or multiple outlets — single or dual valve control.

SEND FOR BUL. No. 37

TRICO FUSE MFG. CO.
MILWAUKEE 45, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1531

COMPLETE THE DIE-SET AT YOUR BENCH

Lacey Die-Set Machine

Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the die-maker to complete a die-set at his bench . . . saves toolroom and handling costs. Ask today for full details.

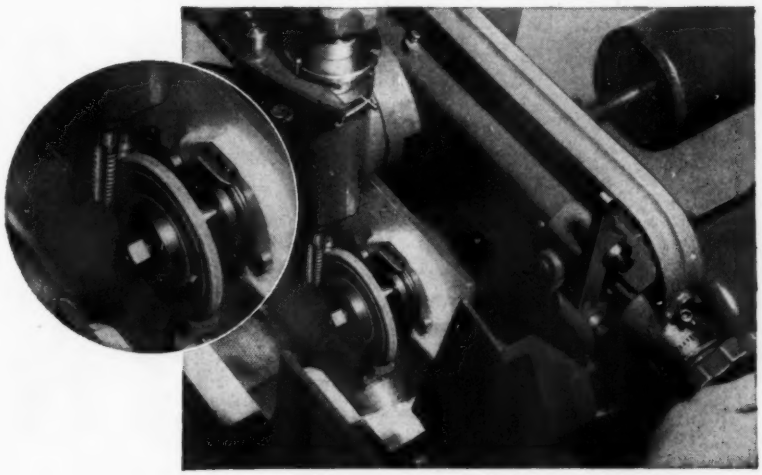
Sole Distributors

MOORE SPECIAL TOOL CO., INC.
726 Union Avenue Bridgeport 7, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1532

NOW – You can control rake or hook angle and insure accurate indexing of cutting edges* of taps with the BLAKE FLUTE GRINDER.

**Just as necessary on taps as on milling cutters.*



Keep it sharp — Make 1 tap do the work of 6 with The Blake Flute Grinder.

This accuracy will result in uniformity of hole, much longer life for your taps and a surprising savings in tap costs.

Write for bulletins on BLAKE Tap Sharpening Machines

EDWARD **BLAKE** COMPANY INC.
MANUFACTURERS OF FLUTE AND CHAMFER GRINDERS
442 CHERRY ST., WEST NEWTON 65, MASS.
Exclusive Distributors of:
Black Diamond Drill Grinders • Surface Finish Standards • Worcester Drill Grinders

CIRCLE INFORM-A-GRAM KEY NO. 1533

MORE EFFICIENCY — LESS WORK

THE MEDELTON **POWEROLL**

AUTOMATIC COIL CRADLE

Every Stamping Room Needs One

One man loads it in a minute . . . no hoists . . . coils roll on . . . no lifting . . . no danger of slippage

No operator fatigue on hand-feed jobs . . . slack loop always maintained . . . steady, sure feed...spoilage minimized

Less space needed . . . cradle butts against press . . . can be moved to other presses when needed . . . slack stored above cradle

Model R-104 for 10" widths, 1000 lb. coils $325
Model R-204 for 13" widths, 2000 lb. coils $405
Model R-304 Handles stock to 24" wide, 48" diameter, weight to 3000 lbs. Price on application.

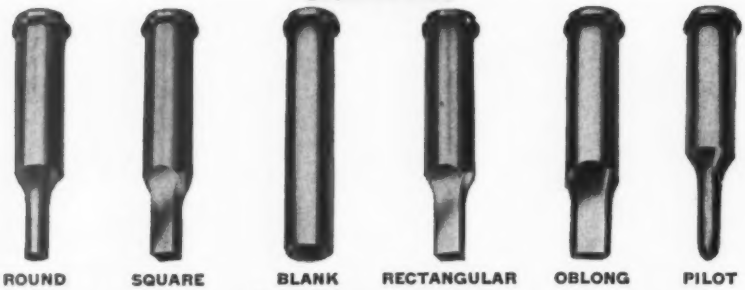
Attractive Discounts to Dealers
Write for descriptive folder

The **medelton** Company, Inc.
335 E. 142 ST., Bronx 54, N. Y.
Toolmakers • Designers • Dies • Stampings

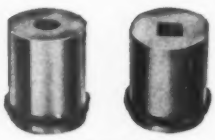
CIRCLE INFORM-A-GRAM KEY NO. 1534

RING PUNCHES AND DIES

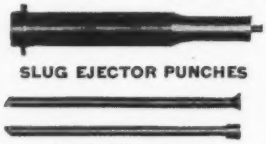
STANDARDS



ROUND SQUARE BLANK RECTANGULAR OBLONG PILOT



TYPE R DIES



SLUG EJECTOR PUNCHES

HIGH SPEED BEVEL & SHOULDER HEAD QUILLS

TYPE R DIE TYPE P DIE

COMPLETELY INTERCHANGEABLE
SHIPMENTS FROM STOCK
CHOICE OF STEELS
HIGH QUALITY
LONG LIFE
LOW COST

NEW!

PUNCH & DIE RETAINERS
Tough alloy retainers accurately machined for Ring Punches and Dies. Ease of mounting saves time and money.

SPECIALS
Send prints or sketches for quotation on your requirements. Prompt deliveries—reasonable prices.

WRITE FOR ILLUSTRATED CATALOG 105

RING PUNCH & DIE, INC.

19 FENTON PLACE JAMESTOWN, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 1541

WHAT'S YOUR ENGRAVING PROBLEM

?

- Need greater speed for engraving light and medium characters . . . use Preis-Panto Model UE or UE-2.
- Does work require heavy duty machines . . . use Preis-Panto Model UE-3.
- Marking metal of extreme hardness, electrical or diamond drag . . . use Preis-Panto UE-M or UM.
- Preparing hardened steel or glass for acid etching. Ask for Preis-Panto Model UA-M.

There's a Model available to solve all your particular problems economically.

Preis is the "one source" solution for your engraving problems. Complete line of accessories and attachments are available for all makes and models.

TRADEMARK PANTO

Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest representative.

H. P. PREIS ENGRAVING MACHINE CO.
647 U.S. Route 22 Hillside, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1544

ACME

TAPS

from Stock!

Immediate shipment from factory stock, 3/8" to 3" diameters by eighths.

Write or wire for catalog prices, or for quotes on specials.

H&R 30
The Threading Specialists

HORSPOOL & ROMINE
MANUFACTURING CO., INC.
5850 Marshall St., Oakland 8, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1545

LIFTING DEVICES
for FAST · SAFE · BETTER Material Handling of · SHEETS · COILS · BOXES · MOLDS · DRUMS · PALLETS · 400 MODELS

H. L. BUSHMAN CO. 160 West Central Ave. Roselle, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1542

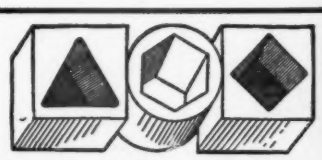
CAMS
To Your Specifications

— Except Screw Machine Cams —

Design Assistance Offered

KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J

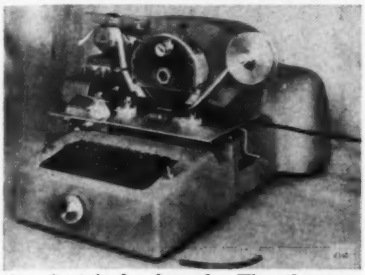
CIRCLE INFORM-A-GRAM KEY NO. 1543



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.

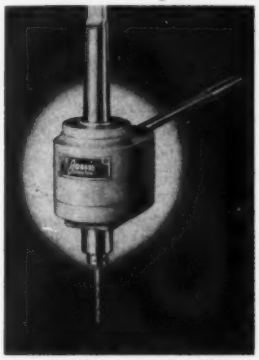
CIRCLE INFORM-A-GRAM KEY NO. 1546

Save Time and Speed Up Marking Operations with an electric keyboard operated wire and tube marking machine. Various sizes of tubing or wire can be branded with a touch on



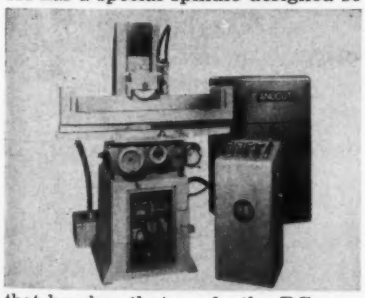
the electric keyboard. The thermostatically controlled head can be set to temperatures as high as 800°. Defiance Machine & Tool Co., 1920 S. Vandeventer Ave., St. Louis 10, or — **Circle Inform-A-Gram No. A57.**

Convert Any Conventional Type Drill Press Spindle into a high speed drilling machine using the Drill-speeder. It has a speed of 30,000



rpm, permits the use of solid carbide drills and reamers, and is ideal for high speed drilling of small holes. Jarvis Corp., Middletown, Conn., or **Circle Inform-A-Gram No. A58.**

An Electrolytic Grinder is used in the grinding and stock removal of carbides, hardened steels, and heat sensitive materials and parts. Model 618 has a special spindle designed so



that brushes that apply the DC current through the spindle are enclosed. This eliminates much dust accumulation on the brushes. Reid Brothers Co., Inc., Beverly, Mass., or—**Circle Inform-A-Gram No. A59.**

3-D Milling of small and medium sized workpieces of both ferrous and non-ferrous metals, can be accomplished with the three standard knee-type vertical milling machines available with numerically controlled operation. The 5-hp Model 2CH-KTNC has 16 spindle speeds ranging from 25 to 1500 rpm. Power for short feed motions is transmitted through low-friction, recirculating ball screws. For literature, write to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis., or — **Circle No. A60.**

★★★★ FEATURE
"Eclipse IN ACTION"
NOW SHOWING AT THE
ASTE TOOL SHOW
PHILADELPHIA • MAY 1-8
SEE: ECLIPSE "ground from the solid" precision end mills demonstrated on a milling machine right in the Eclipse booth, operating at maximum speeds and feeds on various types of material.
CO-STARRING
The complete line of ECLIPSE quality end cutting tools:
★ High Speed Steel Cutters
★ Carbide Tipped Cutters
★ Multi-Diameter Cutters
★ Inserted Blade Cutters
★ Core Drills
★ Back Spotfacers
BOOTH 344 - THE ARENA
See You There!
ECLIPSE COUNTERBORE COMPANY
1600 BONNER AVE., DETROIT 20, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 155

Eliminate Ratchet Plates and Levers, using the Turretable pneumatic feed. The rotating and locating means act on the rim of the turntable itself, rather than through intermediate parts. Close tolerances may be held even when using large dial plates ranging from 24" to 36",

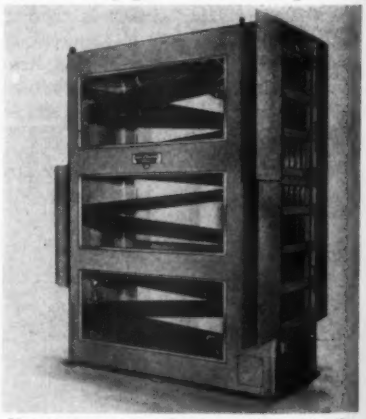
and it will index to 4, 6, or 12 stations. Mead Specialties Co., Dept. TT-P93, 4114 N. Knox Ave., Chicago 41, or — **Circle No. A61.**

A Portable Horizontal Metal Cutting Band Saw, the gasoline engine powered Kalamobile, is used primarily where power is not readily available. Model 610D is used for all types of intermittent cut-off work such as pipe, cable, channel, and angles. Machine Tool Div'n, Kalamazoo Tank & Silo Co., Kalamazoo, Mich., or — **Circle No. A62.**

Light Gage Sheet Forming and Fabricating Operations can be performed on a six foot hydraulically operated press brake with adjustable stroke. Model 20-72 has a maximum capacity of 20-gage mild steel, and

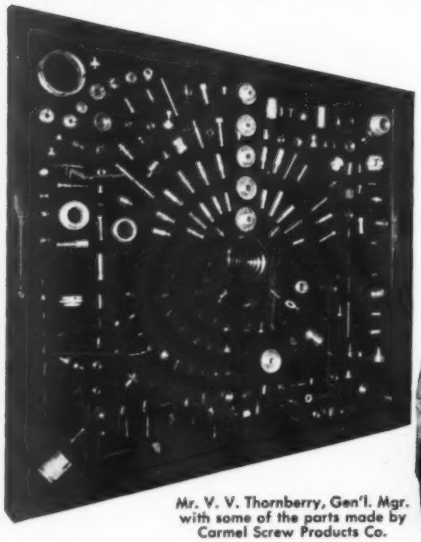
the stroke adjustment permits operator to have complete control over the ram during forming and punching operations. For literature, write to O'Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn., or — **Circle Inform-A-Gram No. A63.**

A High-Capacity Demand-Feed Storage Unit for parts that can roll, was designed for use in automated processing lines. A feature of the unit is a by-pass track that permits



direct passage of parts through the unit, which has a capacity of from 1500 to 3000 parts, size depending. Gear-O-Mation Div'n, Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, or — **Circle No. A64.**

Critical aircraft tolerances "duck soup" with



Mr. V. V. Thornberry, Gen'l. Mgr. with some of the parts made by Carmel Screw Products Co.

Buck® AJUST-TRU POWER CHUCKS

★

INDIANA FIRM BUILDS PRECISION REPUTATION SPECIALIZING ON AIRCRAFT PARTS

★

65% of the more than 200 parts on this display are made with the 7 Buck Power chucks used by the Carmel (Ind.) Screw Products Co., specialists in aircraft parts.

Typical comments by Mr. V. V. Thornberry on Buck performance include: "We thread class 4 tolerances with face runout held within .001" (and less) indicator reading of pitch line of thread"... (another job) "Tolerances are held to better than the Buck guarantee of .001" precision in relation to bore and face with no difficulty..."

At Carmel the Buck Jaw Turning Fixture is used to fabricate jaws in the tool room without having to tie up a production machine.

More and more firms every day are learning that *"It pays to chuck with Buck."* Send for catalog — see why.

Buck POWER CHUCKS

6½"-8¼"-10"-12"

BUCK TOOL COMPANY

418 SCHIPPERS LANE • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 156

TOMCO INC.

HAND WHEELS Straight Type Offset Type

SPECIALS

- HAND KNOBS
- MACHINE HANDLES
- HANDLES
- BALL HANDLES
- LEVERS
- SPECIALTIES

GRADUATED DIALS

SPECIFY TOMCO FOR DEPENDABILITY

A Complete line of high grade hand knobs, levers, handles, hand wheels, graduated dials is available for immediate shipment from stock of standard items. Specialty items made to your specifications.

WRITE FOR INFORMATION

TOMCO INC. 1623 DOUGLAS AVE., RACINE 2, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 1571

KEYWAYS —ACCURATE and UNIFORM with The GLENNY Adjustable Expansion PUSH BROACH because . . .

this sturdy simple tool can be used on any type arbor press for continuous efficient keyways — in any quantity

COSTS OFTEN REDUCED AS MUCH AS 10 TIMES

SEND FOR BULLETIN

DEALERS ALSO WRITE DEPT. TP-4

THE EAST SHORE MACHINE PROD. CO. 70 EAST 201ST STREET CLEVELAND 23, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1572

Magnetic Base Indicator holders

Stainless holding rod set in ball socket

Precision adjustment like surface gage

Erick Magna Holder Model 200B Only $6.50

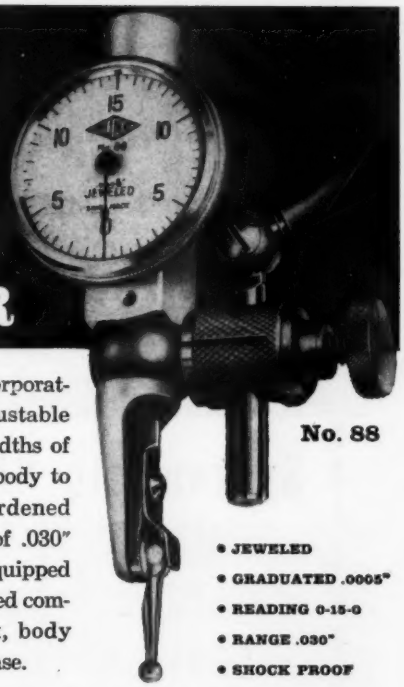
See your dealer or write for catalogue 758 on the most complete line of magnetic base units & access. mfg'd.

Powerful 50 lb. pull base

CULLEN MFG. CO., RACINE, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 1573

ALINA DIAL TEST INDICATOR



A fully reversible indicator incorporating a clear easy-to-read, adjustable dial, graduated in half thousandths of an inch, a switch lever on the body to reverse action and TWO hardened chrome plated contact points of .030" and .100" diameter that are equipped with a non-slip ratchet. Furnished complete with a universal shank, body clamp, and plush lined steel case.

No. 88

- JEWELED
- GRADUATED .0005"
- READING 0-15-0
- RANGE .030"
- SHOCK PROOF

ALINA WRITE FOR LITERATURE AND COMPLETE CATALOG

ALINA CORPORATION

122 East Second St., Mineola, L.I., N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1574

INSERT CHASER H&G DIE HEAD

FOR LESS THAN $50 YOU GET 12 SETS, EACH SET GROUND READY TO GO

Men would not accept either idea at first...

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than $50 you get a dozen sets of ¾—16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "UNIFIED AND AMERICAN SCREW THREAD DIGEST"

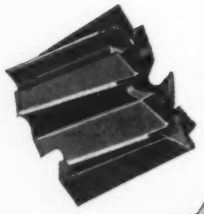
THE EASTERN MACHINE SCREW CORPORATION 29-49 Barclay St., New Haven, Conn.

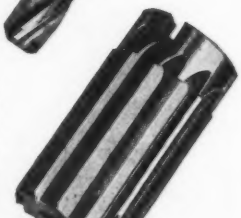
CIRCLE INFORM-A-GRAM KEY NO. 1575

Remember:

A used tool is proved metallurgically sound and makes a sound tool when reworked.

Systematic "NTS" salvage is the best way to cut cutting tool costs





Stop before you discard a worn or damaged cutter. It may be worth many times its scrap value!

Since 1912 we have been restoring all kinds of cutting tools to new usefulness to help shops control their cutter costs.

Can we assist you in studying your operations and tool usage to determine if a salvage program will save money in your plant? There is no obligation.

Write for this catalog and the salvage story.

NATIONAL NTS TOOL SALVAGE

NATIONAL TOOL SALVAGE CO.

6511 EPWORTH BOULEVARD DETROIT 10 MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1581

MAYLINE

THE LATEST IN DRAFTING EQUIPMENT!

You are invited to see and operate the new May-O-Matic drafting table in Booth 1234, A.S.T.E. Convention, Philadelphia, Pa., May 1-8. Only the May-O-Matic has a complete variety of drawer and shelf combinations.

See on display our complete line, including pedestal and 4-Post tables in steel and wood, plan files in both steel and wood, straightedges, kits, and stools.

You will find our exhibit interesting!

Mayline Company
635 No. Commerce St.
Sheboygan, Wisconsin

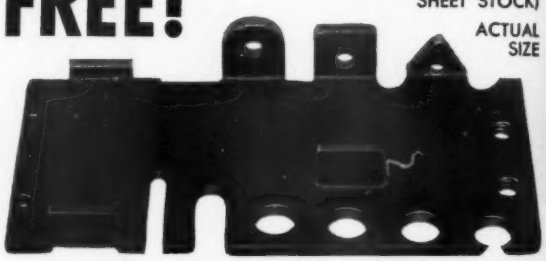
MAYLINE MAYLINE MAYLINE

CIRCLE INFORM-A-GRAM KEY NO. 1582

FREE!

(SAE 1010-3/32" CRS—SHEET STOCK)

ACTUAL SIZE



Short-Run Design Suggestion Sample

ENGINEERS responsible for the design function will welcome this practical short-run stamping sample which *visibly* shows various common conditions that occur in metal fabrication.

An actual production sample, it indicates typical mechanical problems met with in terms of type of material, temper and thickness.

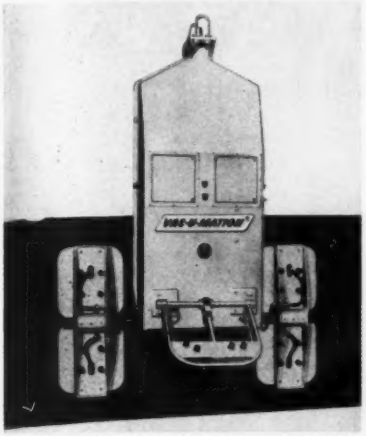
REQUEST SAMPLE AND BULLETIN DDS-2 ON YOUR LETTERHEAD

DAYTON ROGERS *Manufacturing Company*

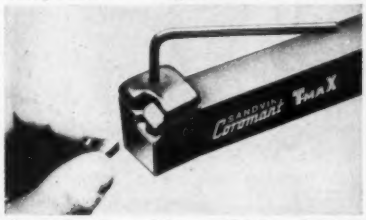
MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 1583

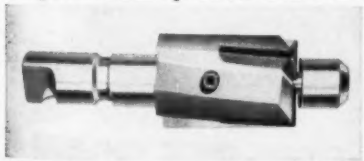
2,000-Lb Capacity is one of the features of the latest model in the Vac-U-Mation heavy-duty series of vacuum lifts. It has a self-contained power tilt, which automatically rotates the cups to vertical or horizontal position, eliminating maneuvering by operations as with lighter models. For literature, write to Vac-U-Mation Div'n, F. J. Littell Machine Co., Dept. 4-F, 4555 N. Ravenswood Ave., Chicago 40, or — **Circle Inform-A-Gram No. A65.**



Minimize Production Interruptions for changing insert cutting edge or depth of cut, using the throwaway type carbide tool holder. The Coromant T-Max holder has an automatically-lifted chipbreaker having three fixed positions which adapt it to light, medium, or heavy cuts. Sandvik Steel, Inc., 1702 Nevins Rd., Fair Lawn, N. J., or — **Circle A66.**



Flaking of Carbide Tips caused by excessive back pressure of the pilot can be avoided by using the improved Metcut carbide counterbore. A special back-up screw holds the pilot clear of the cutting edges to prevent carbide failure. The screw is easily and quickly adjusted, making quick changes possible. Metal Cutting Tools, Inc., 301 S. Water St., Rockford, Ill., or — **Circle No. A67.**



Measure Places Inaccessible to ordinary micrometers using a micrometer with disc measuring faces. It is ideal for measuring gear teeth, forming tools, and dies. It measures to a depth of ⅛" on forms having grooves wider than 0.015". For information, write to The Lufkin Rule Co., Saginaw, Mich., or — **No. A68.**

Production Drilling, tapping, and assembly can be done with the Palmgren No. 32 quick lock vise. The vise has no screw to be damaged by wear or breakage, and is ideal for all operations requiring fast adjustment for various size pieces. For literature, write to Chicago Tool and Engineering Co., 8383 S. Chicago Ave., Chicago 17, or — **Circle A69.**

XLO EX-CELL-O FOR PRECISION
A. Standard DB 24 Spindle
B. DB 50 Motorized Spindle
C. DB 25 Square Body Spindle
D. DB 50 Motorized Quill-Type Spindle
E. DB 22 Square Body Spindle
F. Standard DB 22 Spindle

58-19

Greater Accuracy—with Ex-Cell-O Precision Boring Spindles

You know of the proven superiority of Ex-Cell-O precision boring spindles where close tolerances and fine finishes are required. But did you know that these same Ex-Cell-O boring spindles are available as replacement units?

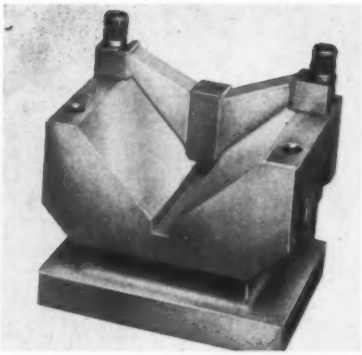
Produced in belt-driven, standard motorized, or high frequency motorized styles, these Ex-Cell-O precision boring spindles are equipped with XLO Precision bearings for maximum spindle rigidity, long life and smooth operation.

For complete information, call your local Ex-Cell-O Representative or send direct for Bulletin 25477.

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN — Machinery Division

CIRCLE INFORM-A-GRAM KEY NO. 159

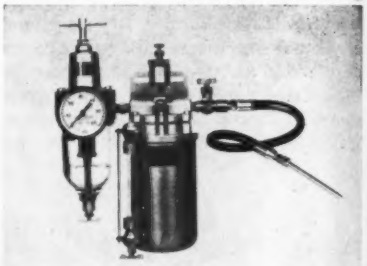


The Quick Detachable and Reversible Swing Clamp Design is a feature of the new 3⅞" capacity V-block, an intermediate size precision setup and inspection tool. Heavy-duty construction provides a massive section for rigidity and accuracy. For literature, write to Taft-Peirce Mfg. Co., Woonsocket, R. I., or — **A70.**

A Straight Side, One Point, Double Action Enclosed Toggle Press Line has been introduced by E. W. Bliss Co., Canton, Ohio. The D-1 series contains presses ranging from

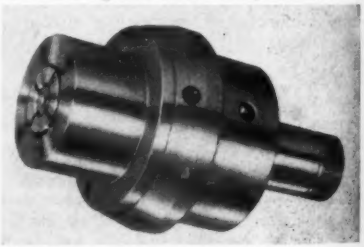
200- to 2000-ton capacities and have a recirculating oil system which lubricates gears, shaft bearings, etc. The press can be equipped with control outlets for automatic feeding, unloading, and transfer devices. **Circle Inform-A-Gram No. A71.**

Four Spray-Lube Units make possible low-cost, compact installations for spray applications of cutting liquids to lubricate and cool either one or two cutting tools. The filter-regulator unit removes damaging



liquids and solids from the air stream, preventing contamination of the cutting oil. For information, write to C. A. Norgren Co., 3400 S. Elati, Englewood, Colo., or — **A72.**

Expanding Collets for precision internal chucking simplify tooling, handling, and machining operations, and make it easy to obtain concentric and square shoulders, faces, and



diameters from a previously machined bore. Both the stationary expanding collet and work locating stop have no end movement. Hardinge Bros., Inc., Elmira, N. Y., or — **Circle Inform-A-Gram No. A73.**

ARE YOU USING- HOVIS UNIVERSAL Master COMPOUND DIES

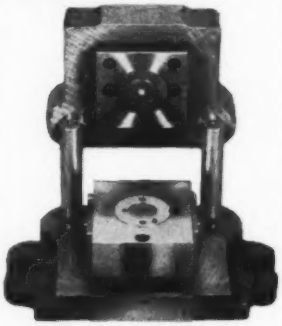
to Produce WASHERS and SMALL STAMPINGS from all Types of Materials the ECONOMICAL WAY?

SAVES DESIGNING COST TIME • LABOR MATERIALS STORAGE SPACE

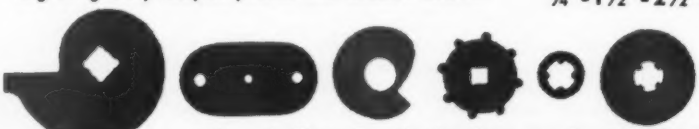
The "MODERN METHOD" adopted by MANUFACTURERS NATIONALLY

NO NEED TO MAKE A NEW DIE FOR EVERY STAMPED PART

● By simply removing and replacing five, small, interchangeable inserts a new part may be produced . . . This method makes possible all production including irregularly shaped pieces and shallow draws.



Made in 5 sizes:
¾" - 1½" - 2½" - 4" - 6"



"Visit Our Booth No. 1064, A.S.T.E. Show"

Specialists in designing and manufacturing MULTI-DIES as well as supplying COMPLETE TOOLING FOR ALL SIZES OF NUT FORMERS

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD • BOX G • WARREN, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit

CIRCLE INFORM-A-GRAM KEY NO. 160

Most Drilling Per Dollar!

Features Found Only In Highest Priced Radials

- Finger-Tip Clutching
- Automatic Drill Ejector
- Push Button Elevation
- Centralized Controls
- Hardened Column & Way Inserts
- Automatic Depth Control
- Timken Bearing Column & Spindle
- Head Glides on Ball Bearing Rollers

Refer to Sweet's Machine Tool File (IAIVE) for our catalog

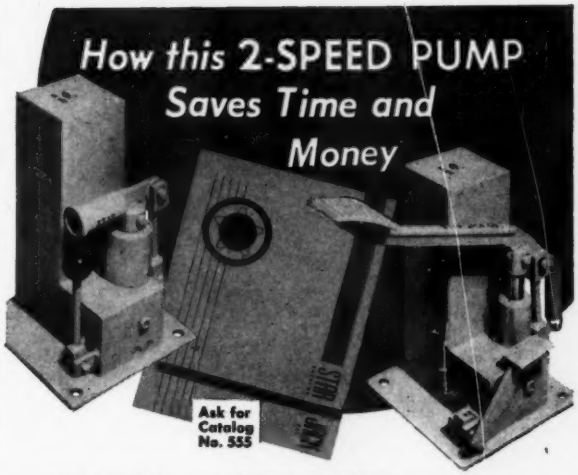
Send for Brochure of **Veet's** 16 Points of superiority and name of nearest dealer, who will arrange actual demonstration of the **Veet** Radial, in your plant, without obligation.

MFGD. BY **Veet INDUSTRIES** EAST DETROIT, MICH. Tel PRescott 6-3000

See the Veet Radial Drill in action at ASTE Show, Booth 1262—Phila. May 1-8.

CIRCLE INFORM-A-GRAM KEY NO. 1611

How this 2-SPEED PUMP Saves Time and Money



STAR Hi-Lo 2-SPEED PUMP (hand or foot model) operates at high speed, brings ram to load 6 to 15 times faster than a single speed pump, then automatically changes over to high pressure. Maximum capacity 10,000 psi.

SPEEDS WORK, SAVES EFFORT

Safety overload valves, oil capacity 160 cu. in. or larger, chrome plated concentric pistons 1¼" and ½", 1½" and ½", 2" and ½", all with 1½" stroke.

Special engineering counsel and proposals cheerfully submitted on request.

Representative areas available.

STAR JACK CO., INC.
420 LEXINGTON AVE., Dept. T&P, N.Y.C. 17
PLANT: RIVER GROVE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1612

You Need an Extra Hand Now to Speed Up Production!

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1613

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it" Simple to operate.

Write for circular and prices

LAWRENCE H. COOK, INC.
68 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 1614

PRESSURELOK-224

the best diamond wheel ever developed for carbide tool grinding. Guaranteed ultimate cutting life from each diamond particle in every wheel.

UNITED STATES DIAMOND WHEEL CO.
1833 ILLINOIS AVE. AURORA, ILL.

US

IMMEDIATE DELIVERY on all wheel sizes, STRAIGHT, DISH, CUP, FLARE and MOUNTED WHEELS; HONES.

CIRCLE INFORM-A-GRAM KEY NO. 1615

ALEXANDER

DEEP THROAT ENGRAVER does . . .

Precise, two-dimensional work. It handles workpieces up to 10" high, 38" wide, on a worktable 20 x 8"; optional auxiliary table 18 x 24". Ratios — 1:1 to 1:50. Spindle has fine and coarse feed adjustments. Cutters up to ¼" dia. Speeds—2800 to 15,000 rpm. ¼ hp motor.

Write for catalog B.

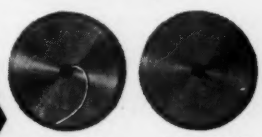
J. ARTHUR DEAKIN & SON
150-28 Hillside Ave., Jamaica 32, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1616

NOW GET CLEAN SURFACED PARTS FROM YOUR AUTOMATICS . . . UNMARRED BY TOOL WITHDRAWAL MARKS

THE NEW RELIEVOMATIC SELF-RELIEVING TOOL HOLDER

SAVES YOU COSTLY SECONDARY FINISHING OPERATIONS



Avoid scratches like this

All clear with "Relievomatic!"

Easily installed on cross-slide or turret

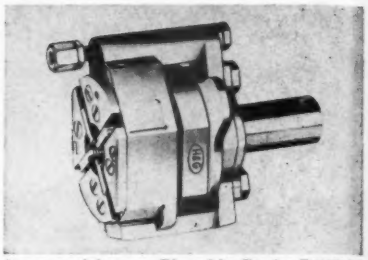
Write today for details.

SILBER PRODUCTS, INC. Nightingale 9-8600
870 Essex Street • Brooklyn 8, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1617

Inserted High-Speed-Steel Blade Milling Cutters will face aluminum and its alloys. The cutters feature a generous size blade for extending blade life and ample length for deep shoulder cutting operations. For literature, write to Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, or — **Circle Inform-A-Gram No. A74.**

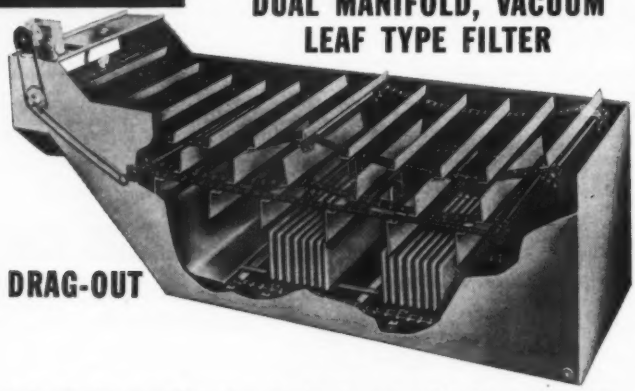
Aluminum Die Heads greatly reduce the wear and vibration on turret indexing mechanisms because of the lighter weight, an important factor on the new high speed indexing machines. Size 00, Style DMLN type with a 7/16" capacity will cut up to ½ dia in fine pitch, short threads. The Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven 6, Conn., or — **Circle No. A75.**



Filters Heavy Loads

Delpark Filter-Matic

DUAL MANIFOLD, VACUUM LEAF TYPE FILTER



WITH DOUBLE DRAG-OUT

● Developed to handle heavy solids volume and continuous filtering operation on wet type dust collectors. Leaf type filter elements have greater filter surface area, permit high filtrate flow. Two expeller flight systems remove foam borne contaminants and solids blown from filter elements during backwash. One manifold filters while the other backwashes.

Units available 5 to 1000 gallons per minute on water. Multiple units used on larger capacity requirements.

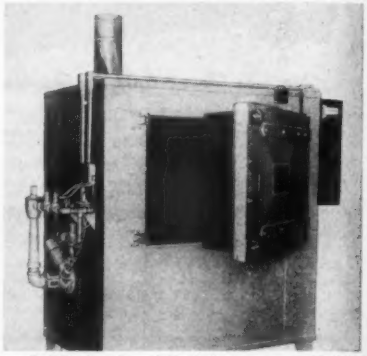
WRITE FOR NEW LITERATURE ON DUAL MANIFOLD FILTERS

Delpark —First in Filtration Advancement

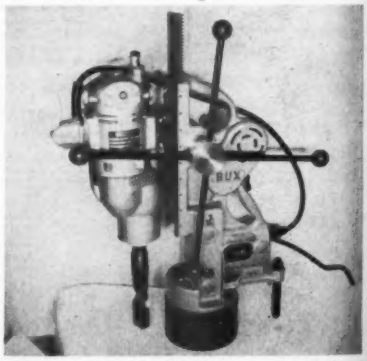
INDUSTRIAL FILTRATION COMPANY
65 INDUSTRIAL AVENUE
LEBANON, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 162

Solution Heat Treating and similar processes can be done with a line of 1000°F recirculating furnaces. This gas-fired Model HX-1000 has a work chamber 38" wide, 20" deep, and 26" high. Models are available with electric heat, too. Grieve-Hendry Co., Inc., 1401 W. Carroll Ave., Chicago 7, or — **Circle Inform-A-Gram No. A76.**

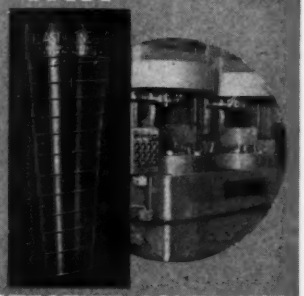


A Mechanical Action Drill Positioning Device has been designed into Bux portable magnetic drill press units. This provides freedom to rotate the drill point a full 330° about the magnetic base, with lateral movement up to 1⅛" for accurate positioning. It is useful for drilling holes overhead or vertically. Buck Mfg. Co., 1335 N. 10 St., P. O. Box 692, San Jose, Calif., or — **Circle Inform-A-Gram No. A77.**



NEW WAY

to lower production costs... improve product efficiency



ELASTICONE® PROTECTIVE COVERINGS

cover-up vital exposed shafts and bushings!

Versatile Elasticones snap over all types of exposed shafts, bushings, pins and screws, guarding them against damage, reducing breakage, lubrication problems and shutdown time.

Elasticones are spirally wound cones of flat steel, formed in all sizes to meet all requirements. They're low-costing, easy to install.

Write for complete data including new Bulletin '57.

CENTRAL Safety Equipment Co.
6603 Marsden Street Philadelphia 35, Pa.

CIRCLE INFORM-A-GRAM KEY NO. 1631

GAGE COMPANY Deep-Etch

PRECISION PLASTIC • NON-BREAKABLE

COMPARATOR SCALES

Highly accurate and designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

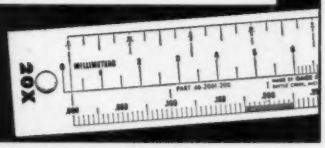
Supplied on Gage Company Precision Plastic . . . a sturdy, non-breakable material of constant stability, .125 in thickness.

Unexcelled as a tool for use in drafting and engineering scale layouts for use on comparators.

Available in all standard magnifications and in several lengths. Various styles for all applications.

WRITE FOR BULLETIN NO. 58-70

GAGE COMPANY
• • • BOX 1080
Battle Creek, Michigan



CIRCLE INFORM-A-GRAM KEY NO. 1632

NOW, more than ever, the VINCO OPTICAL DIVIDING HEAD is needed for proving tooth spacing accuracy

Tooth spacing accuracy of a 22.500", 720 tooth gear, produced by Vinco, being checked on a dividing head.

GEAR SPECIFICATIONS

720 teeth; 32 diametral pitch; 14½° pressure angle; 22.500" pitch diam.

Tolerances	Specified	Measured
Total composite error	.0006"	.00035"
Total index error	.0007"	.0002"

GUARANTEED ACCURACY—2 seconds of arc. SPINDLE RUNOUT less than 25 millionths of an inch. Such accuracy is a "MUST" as a final inspection authority on aircraft precision components, critical parts and assemblies of missile guidance systems, precision gear trains, index plates, cams, automatic controls, the calibration of involute checkers and master involutes. Either cast iron or granite surface plates available on Vinco dividing heads. All Vinco surface plates have a flatness accuracy within .0002".

Model 55—38 is available either with a 20" x 40" surface plate; capacity between work centers 22", or a 20" x 72" surface plate; capacity between work centers 54". Both have a work swing of 12⅞" dia.

The heavy duty dividing head is built to handle work with a swing up to 24⅞" dia. Surface plate is 36" x 72". This model has the same accuracy as the standard model.

Send for brochure giving all details.

Vinco specializes in the contract manufacture of missile subassemblies, aircraft components, precision gears, splined parts

VINCO CORP.
9111 Schaefer Hwy.
Detroit 28, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1633

Are you STUMPED

FOR THE RIGHT TOGGLE CLAMP?...

Got a tough work-holding job that's bothering you . . . one which needs quick-acting and powerful clamping?

It's 100 to 1 you'll find the answer among 120 standard DE-STA-CO Toggle Clamps and scores of spindle accessories.

Even more! Our engineers will give you suggestions if you send a print or rough sketch.

And there's a DE-STA-CO Stocking Distributor nearby.

Our 40-page DE-STA-CO Catalog is yours for a postcard or letter . . . . . .

DE-STA-CO 4 TYPICAL CLAMPS

DETROIT STAMPING COMPANY

Manufacturer of America's FIRST Line of TOGGLE CLAMPS

Midland Avenue
Detroit 3, Michigan

TRY... DE-STA-CO TOGGLE CLAMPS

CIRCLE INFORM-A-GRAM KEY NO. 1641

ROTARY BUSHINGS

For DRILLING, CORE DRILLING, ROUGH and FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work — or both.

Eliminates expensive tool construction — Reduces tool wear — Prevents seizure and pilot breakage — Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.

42322 ANN ARBOR RD., PLYMOUTH, MICH.
Telephone PLYMOUTH 1472

CIRCLE INFORM-A-GRAM KEY NO. 1642

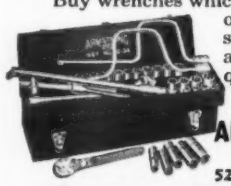
ARMSTRONG WRENCHES

Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less tiring.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength.

Buy wrenches which carry the trade names HI-TEN or ARMALOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.



Write for catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5220 W. Armstrong Ave., Chicago 30, Ill.

See us at our BOOTH No. 308 ASTE SHOW

CIRCLE INFORM-A-GRAM KEY NO. 1643

TAKES YOUR EYE TO "INACCESSIBLE" INTERIORS

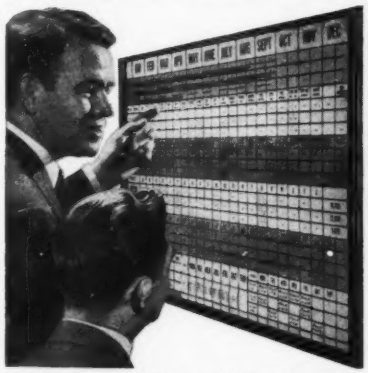
The National Fontar® Borescope provides sharp, critical close-up vision aided by bright lighting in any bore, threaded hole, recess or interior surface of the cast, drawn, welded or molded product. All that is needed is a point of entry .10" or larger . . . . It's today's essential for high Quality Control standards. Our new and free catalog illustrates and describes applications.

ASK FOR 'BORESCOPE CATALOG'

ENGELHARD INDUSTRIES, INC.
NATIONAL ELECTRIC INSTRUMENT DIVISION
92—21 Corona Avenue • Elmhurst 73, New York

CIRCLE INFORM-A-GRAM KEY NO. 1651

You Get Things Done With Boardmaster Visual Control



- ☆ Gives Graphic Picture of Your Operations —Spotlighted by Color
- ☆ Facts at a glance — Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate — Type or Write on Cards, Snap in Grooves
- ☆ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
- ☆ Made of Metal. Compact and Attractive, Over 250,000 in Use

Complete price **$49.50** including cards

FREE 24-PAGE BOOKLET NO. Z-500 Without Obligation

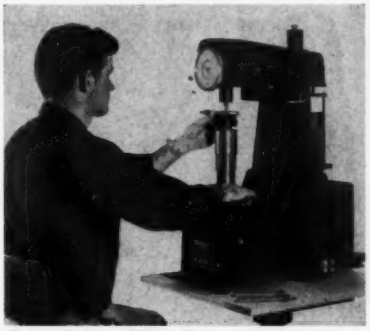
Write for Your Copy Today

GRAPHIC SYSTEMS

55 West 42nd Street • New York 36, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1652

A Superficial Hardness Testing Instrument, the Twin-Tester, is capable of performing the work of two conventional single-range units in measuring the Rockwell hardness of metals and alloys. The unit's vertical capacity is 8", 12", or 16" and its throat depth is 5½". For literature, write to American Chain & Cable

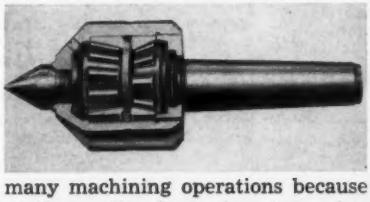


Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn., or — **No. A78.**

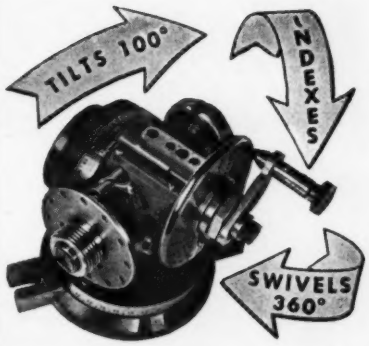
Eliminate Much Set-Up Time for rotary and angular machining done on a vertical mill using the improved cross-slide rotary table. Ratio is now 90 to 1, or 4° per revolution. The

workshaft has been increased to a larger diameter, and the positive locking method is now incorporated into the wormshaft dial. For literature, write to Advance Products Corp., Benton Harbor, Mich., or — **Circle Inform-A-Gram No. A79.**

Trico Live Centers, mounted on heavy-duty precision Timken tapered roller bearings, absorb extreme thrust and heavy radial loads with minimum wear. Heavier cuts at faster turning speeds are possible, and the centers are adaptable for



many machining operations because of the easily changed center point. Trico Machine & Mfg. Co., 35700 Vine St., Willoughby, Ohio, or — **Circle Inform-A-Gram No. A80.**



FOR FASTER PRODUCTION

THE ELLIS DIVIDING HEAD

Although it is built to fine instrument standards, the ELLIS is a really rugged tool room or production tool that's designed for unusual versatility. Its universal motions — swiveling in two planes — will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!

NICHOLS MORRIS CORPORATION

76-X MAMARONECK AVE.
WHITE PLAINS, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1653

economically priced press room equipment

DURANT Automatic Stock Reels

Operates by natural spring of uncoiling stock. Priced from $75.00. Nine other models of stock reels in vertical, horizontal, motorize or automatic types for all applications.

Manufacturers of Stock Reels, Roll Feeds, Straighteners, Scrap Choppers, Die Pullers, Foot Presses, Coil Cradles, Press Guards, Stock Oilers.

WRITE FOR NEW FREE CATALOG

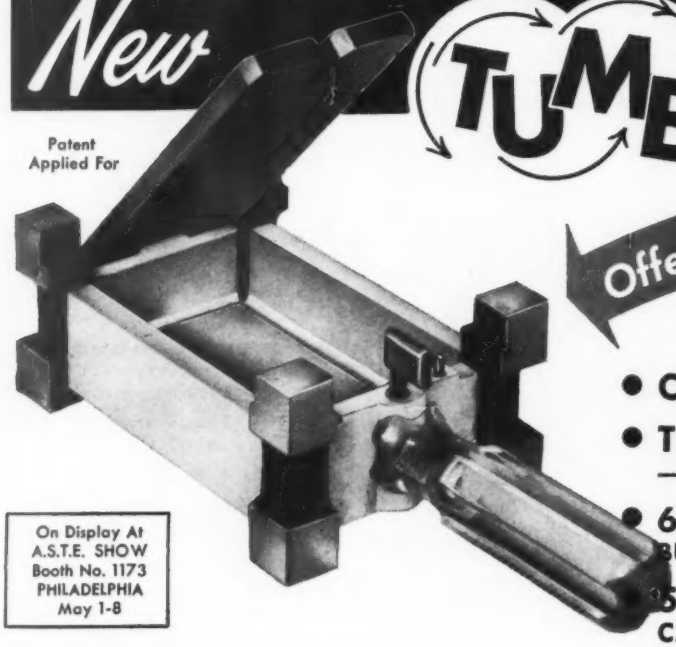
DURANT Tool Supply Co.

PROVIDENCE 3, RHODE ISLAND

CIRCLE INFORM-A-GRAM KEY NO. 1654

New TUMBLE BOX JIG

Patent Applied For



Offers Many Big Advantages

AVAILABLE IN **47** SIZES

- **ONE-HALF THE WEIGHT**
- **TRI-METAL CONSTRUCTION** —ALUMINUM—CAST IRON—STEEL
- **6-SIDE UTILITY**—CAN USE HEAD-TYPE BUSHINGS, ON SIDES, TOP, BOTTOM
- **6 HANDLE LOCATIONS**—HANDLE CAN BE ATTACHED TO ANY SIDE OR BOTTOM
- **ONE HAND OPERATION**—THUMB SCREW RELEASES LID INSTANTLY
- **LEAF "POP-UP"**—AUTOMATIC ACTION SPRING PLUNGER SNAPS LID OPEN
- **STABLE**—RUGGED CONSTRUCTION

On Display At A.S.T.E. SHOW Booth No. 1173 PHILADELPHIA May 1-8

Standard Parts is First with Exclusive New "TUMBLE" Jig

Light Weight and Ease of Handling Boost Production, Cut Operator Fatigue

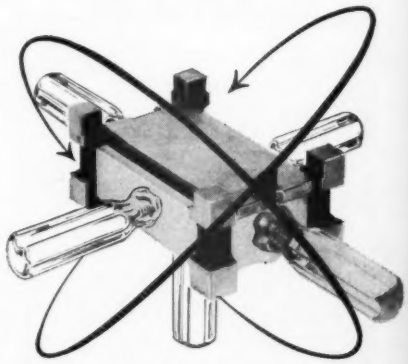
New design features, new engineering concepts, new construction techniques . . . . are incorporated in this outstanding line of "Tumble" Box Jigs. By combining 3 metals—aluminum, cast iron, steel—half the weight has been eliminated. This increases efficiency and production. The sturdy handle (can be located on any side) makes tumbling fast, easy and safe.

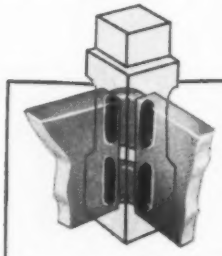
Bushings can be used on all 6 sides. A unique interlocking feature is the aluminum through the cast iron legs, which assures strength and stability. Walls can easily be machined without distorting the Jig. 47 Sizes available 1" x 1" x 1" to 4" x 8" x 4".

Full size Tracing Templates are available for all 47 sizes.

HANDLE (as illustrated) may easily be attached on any side or bottom of the jig as needed.

TUMBLE—Universal tumble direction (as illustrated) is advantage of this lightweight jig — where handle can be located where desired.





Interlocking Leg Joint

Aluminum goes all the way through the cored slots in the cast iron legs—forms a unified, interlocking joint — assuring light weight, but rugged strength.

Ask For TUMBLE JIG Bulletin, Sizes, Prices.

FREE CATALOG—*Write for Your Copy!*

Standard Parts Company offers the most complete line of fine quality tool room standards available today. All Standard components incorporate the latest safety, efficiency and performance features desired by the trade. You can depend on Standard Components . . . they will never let you down. Our New Sixth Edition CATALOG—covering our complete line—is now ready for you. Tracing sheets are available.

STANDARD PARTS CO.

1002 BROADWAY · BEDFORD, OHIO · BEDFORD 2-2800

CIRCLE INFORM-A-GRAM KEY NO. 166

READER SERVICE CARD **APRIL 1958 ISSUE**

DO NOT USE THIS CARD AFTER JUNE 30, 1958

INFORM-A-GRAM

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

TOOLING and PRODUCTION:

Please have information on items circled sent to me.

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

(Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.)

ADVERTISEMENTS

2	22	47	67	120	150	180	1303	1551	1612	1711	1803	1941
3	23	48	68	121	152	187	1304	1552	1613	1712	1804	1942
4	25	49	70	122	155	189	1411	1553	1614	1713	1831	1951
5	26	50	100	123	156	191	1412	1554	1615	1721	1832	1952
6	27	51	105	124	159	199	1413	1561	1616	1722	1833	1953
7	29	52	106	125	160	200	1441	1562	1617	1723	1834	1971
8	30	53	107	126	162	1301	1442	1563	1631	1751	1861	1972
9	31	54	108	127	166	1302	1443	1564	1632	1752	1862	1973
10	33	55	109	129	167	1303	1444	1565	1633	1753	1863	1981
11	34	56	110	131	169	1341	1471	1566	1641	1761	1864	1982
12	35	57	111	133	170	1342	1472	1571	1642	1762	1901	1983
13	36	58	112	135	173	1343	1473	1572	1643	1763	1902	1984
15	38	59	113	137	174	1344	1481	1573	1651	1764	1903	1985
16	39	60	114	139	177	1361	1482	1574	1652	1791	1921	
17	41	61	115	140	178	1362	1483	1575	1653	1792	1931	
18	42	62	116	143	181	1363	1484	1581	1654	1793	1932	
19	43	63	117	145	182	1364	1511	1582	1681	1794	1933	
20	45	64	118	146	184	1381	1512	1583	1682	1801	1934	
21	46	66	119	149	186	1382	1513	1611	1683	1802	1935	

EDITORIAL ITEMS

A1	A20	A36	A59	A77	B16	B36	B64	B2	B21	B40	B59	B78	B97	B116
A2	A21	A40	A39	A76	B17	B30	B66	B3	B22	B41	B60	B79	B98	B117
A3	A22	A41	A60	A79	B18	B37	B86	B4	B23	B42	B61	B80	B99	B118
A4	A23	A42	A61	A80	B19	B38	B87	B6	B24	B43	B62	B81	B100	B119
A5	A24	A43	A62	B1	B20	B39	B88	B6	B25	B44	B63	B82	B101	B120
A6	A25	A44	A63	B2	B21	B40	B89	B7	B26	B45	B64	B83	B102	B121
A7	A26	A45	A64	B3	B22	B41	B90	B8	B27	B46	B65	B84	B103	B122
A8	A27	A46	A65	B4	B23	B42	B91	B9	B28	B47	B66	B85	B104	B123
A9	A28	A47	A66	B5	B24	B43	C1	B10	B29	B48	B67	B86	B105	B124
A10	A29	A48	A67	B6	B25	B44	C2	B11	B30	B49	B68	B87	B106	B125
A11	A30	A49	A68	B7	B26	B45	C3	B12	B31	B50	B69	B88	B107	B126
A12	A31	A50	A69	B8	B27	B46	C4	B13	B32	B51	B70	B89	B108	B127
A13	A32	A51	A70	B9	B28	B47	C5	B14	B33	B52	B71	B90	B109	B128
A14	A33	A52	A71	B10	B29	B48	C6	B15	B34	B53	B72	B91	B110	B129
A15	A34	A53	A72	B11	B30	B49	C7	B16	B35	B54	B73	B92	B111	B130
A16	A35	A54	A73	B12	B31	B50	C8	B17	B36	B55	B74	B93	B112	
A17	A36	A55	A74	B13	B32	B51	C9	B18	B37	B56	B75	B94	B113	
A18	A37	A56	A75	B14	B33	B52	C10	B19	B38	B57	B76	B95	B114	
A19	A38	A57	A76	B15	B34	B53	S1	B20	B39	B58	B77	B96	B115	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of *TOOLING and PRODUCTION* readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured — all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

Our reader service department is handling over 100,000 reader inquiries per year and it is essential that the blanks at the top of each card be filled in accurately and completely. Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.

READER SERVICE CARD **APRIL 1958 ISSUE**

DO NOT USE THIS CARD AFTER JUNE 30, 1958

INFORM-A-GRAM

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

TOOLING and PRODUCTION:

Please have information on items circled sent to me.

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

(Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.)

ADVERTISEMENTS

2	22	47	67	120	150	180	1303	1551	1612	1711	1803	1941
3	23	48	68	121	152	187	1304	1552	1613	1712	1804	1942
4	25	49	70	122	155	189	1411	1553	1614	1713	1831	1951
5	26	50	100	123	156	191	1412	1554	1615	1721	1832	1952
6	27	51	105	124	159	199	1413	1561	1616	1722	1833	1953
7	29	52	106	125	160	200	1441	1562	1617	1723	1834	1971
8	30	53	107	126	162	1301	1442	1563	1631	1751	1861	1972
9	31	54	108	127	166	1302	1443	1564	1632	1752	1862	1973
10	33	55	109	129	167	1303	1444	1565	1633	1753	1863	1981
11	34	56	110	131	169	1341	1471	1566	1641	1761	1864	1982
12	35	57	111	133	170	1342	1472	1571	1642	1762	1901	1983
13	36	58	112	135	173	1343	1473	1572	1643	1763	1902	1984
15	38	59	113	137	174	1344	1481	1573	1651	1764	1903	1985
16	39	60	114	139	177	1361	1482	1574	1652	1791	1921	
17	41	61	115	140	178	1362	1483	1575	1653	1792	1931	
18	42	62	116	143	181	1363	1484	1581	1654	1793	1932	
19	43	63	117	145	182	1364	1511	1582	1681	1794	1933	
20	45	64	118	146	184	1381	1512	1583	1682	1801	1934	
21	46	66	119	149	186	1382	1513	1611	1683	1802	1935	

EDITORIAL ITEMS

A1	A20	A36	A59	A77	B16	B36	B64	B2	B21	B40	B59	B78	B97	B116
A2	A21	A40	A39	A76	B17	B30	B66	B3	B22	B41	B60	B79	B98	B117
A3	A22	A41	A60	A79	B18	B37	B86	B4	B23	B42	B61	B80	B99	B118
A4	A23	A42	A61	A80	B19	B38	B87	B6	B24	B43	B62	B81	B100	B119
A5	A24	A43	A62	B1	B20	B39	B88	B6	B25	B44	B63	B82	B101	B120
A6	A25	A44	A63	B2	B21	B40	B89	B7	B26	B45	B64	B83	B102	B121
A7	A26	A45	A64	B3	B22	B41	B90	B8	B27	B46	B65	B84	B103	B122
A8	A27	A46	A65	B4	B23	B42	B91	B9	B28	B47	B66	B85	B104	B123
A9	A28	A47	A66	B5	B24	B43	C1	B10	B29	B48	B67	B86	B105	B124
A10	A29	A48	A67	B6	B25	B44	C2	B11	B30	B49	B68	B87	B106	B125
A11	A30	A49	A68	B7	B26	B45	C3	B12	B31	B50	B69	B88	B107	B126
A12	A31	A50	A69	B8	B27	B46	C4	B13	B32	B51	B70	B89	B108	B127
A13	A32	A51	A70	B9	B28	B47	C5	B14	B33	B52	B71	B90	B109	B128
A14	A33	A52	A71	B10	B29	B48	C6	B15	B34	B53	B72	B91	B110	B129
A15	A34	A53	A72	B11	B30	B49	C7	B16	B35	B54	B73	B92	B111	B130
A16	A35	A54	A73	B12	B31	B50	C8	B17	B36	B55	B74	B93	B112	
A17	A36	A55	A74	B13	B32	B51	C9	B18	B37	B56	B75	B94	B113	
A18	A37	A56	A75	B14	B33	B52	C10	B19	B38	B57	B76	B95	B114	
A19	A38	A57	A76	B15	B34	B53	S1	B20	B39	B58	B77	B96	B115	

Which article in this issue was of most interest to you? _____

FIRST CLASS
PERMIT No. 7879
CLEVELAND, O.

BUSINESS REPLY CARD

No Postage Stamp Necessary If Mailed in the United States

5c POSTAGE WILL BE PAID BY

TOOLING & PRODUCTION MAGAZINE

P. O. BOX 3505

CLEVELAND 18, OHIO

FIRST CLASS
PERMIT No. 7879
CLEVELAND, O.

BUSINESS REPLY CARD

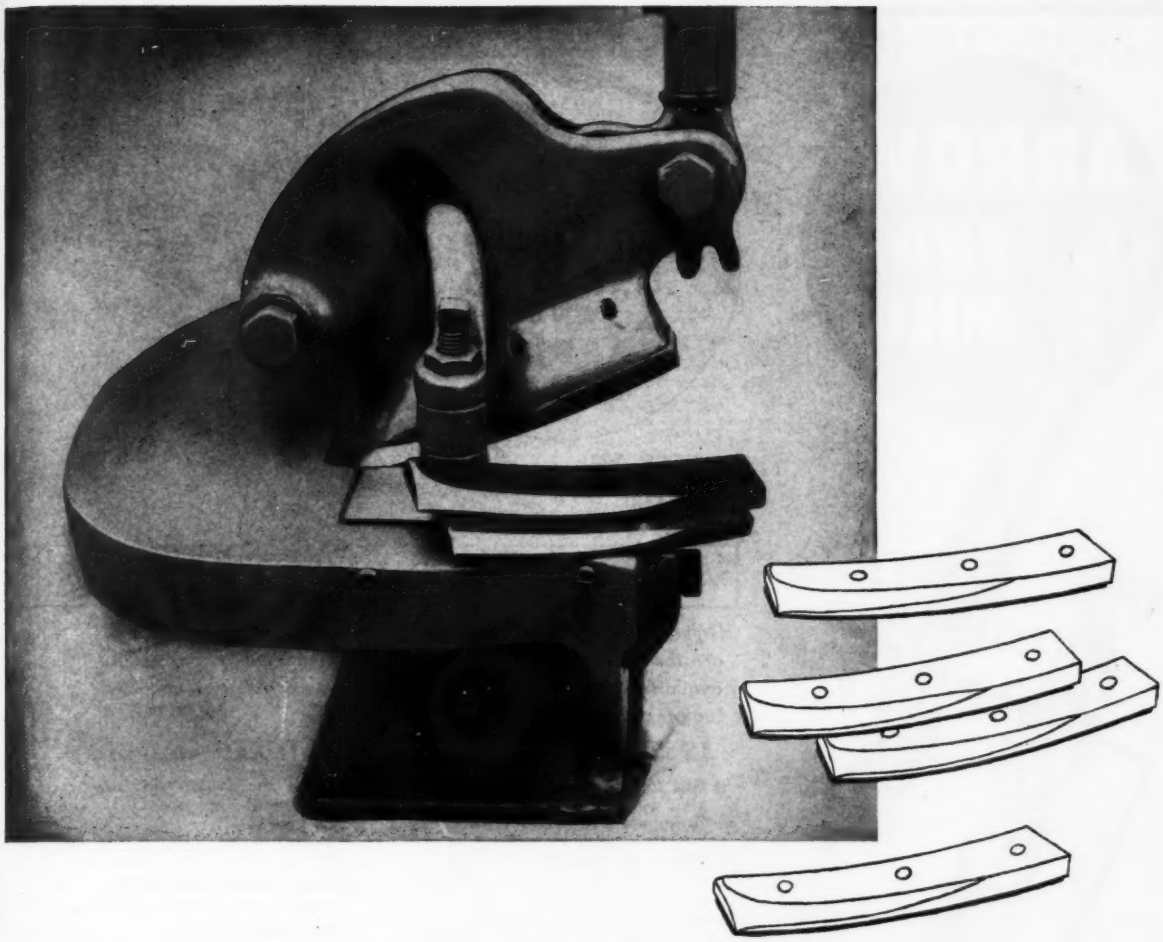
No Postage Stamp Necessary If Mailed in the United States

5c POSTAGE WILL BE PAID BY

TOOLING & PRODUCTION MAGAZINE

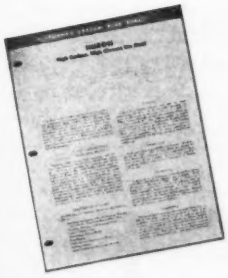
P. O. BOX 3505

CLEVELAND 18, OHIO



Shear Manufacturer ups blade life 4 to 5 times...

with A-L HURON DIE STEEL



Write for Your
HURON BLUE SHEET

A compilation of facts on the handling and shop treatment of Huron. Includes complete information on forging, annealing, tempering, etc. and detailed laboratory data on physical characteristics. *Ask for your free copy.*

ADDRESS DEPT. TP-4

A Chicago bench shear manufacturer produced some test blades of A-L HURON die steel—heat treated to 61-62 Rockwell C.

Service life of the HURON blades proved to be four to five times that of the former blades. Resharpenings were reduced 75 to 80%! Because these new HURON blades held an exact take and maintained a proper cutting arc, they easily sheared 3/16" mild steel or 10 gauge stainless.

HURON die steel was developed for use where high resistance to wear and abrasion is necessary, and where heavy pressure rather than sudden shock must be withstood. HURON has excellent non-deforming properties, and hardens to a great depth.

There is an A-L tool steel that will help solve your cutting, forming or blanking problem. Call our nearest office or distributor today about your requirements. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

For nearest representative, consult Yellow Section of your telephone book.

For complete MODERN Tooling, call

Allegheny Ludlum

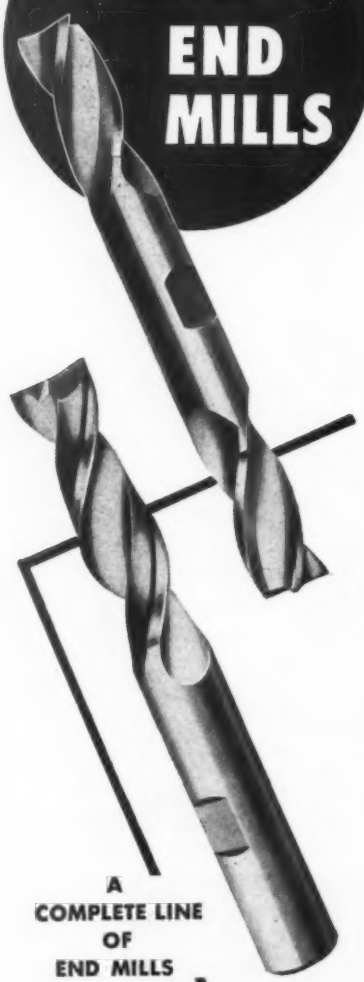
WBW 8388

AL FINE TOOL STEELS SINCE 1854

CIRCLE INFORM-A-GRAM KEY NO. 167

ESTABLISHED 1916

ARROW END MILLS



A COMPLETE LINE OF END MILLS

Since 1916 Arrow has been a major supplier of End Mills — one of the oldest because Arrow has always been one of the best.

The Arrow line consists of all type of End Mills plus H. S. Steel and Carbide Tipped Specials.

ARROW TOOL & REAMER CO.
711 Stephenson Highway
P. O. Box 338 • Troy, Michigan

CALL
YOUR ARROW DISTRIBUTOR

CIRCLE INFORM-A-GRAM KEY NO. 1681

FOR THE "HOLE" FIELD

NEW CONCEPT IN AUTOMATIC DRILLING AND TAPPING UNITS

MODEL 500
DULL TOOL LITE
AND
SUB-BASE

AUTOMATION | **DRILLMATION** | **TAPMATION**

Drillmation's hydraulic, locked-circuit feed Drilling and Tapping Units are the finest and most completely self-contained of any similar unit available today. Drillmation also offers more essential and exclusive features. Write TODAY for literature.

12 ESSENTIAL Exclusive FEATURES in 1 Unit

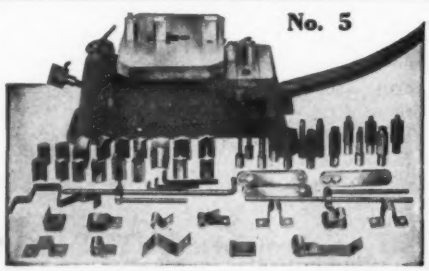
- **DULL TOOL CONTROL** Unit will withdraw tool from work and indicate to operator when tool becomes dull.
- **RAPID TOOL CHANGE** Tool may be replaced without changing the controls.
- **UNIFORM TIME CYCLE** Maintains comparatively constant time cycle even when tools become dull.
- **SELF-CONTAINED HYDRAULIC SYSTEM** Delivers only the oil pressure required to overcome machining resistance.
- **COMPLETELY AUTOMATIC** Enclosed electric controls. Unit is "Fail Safe".
- **THRUST CONTROL** Maximum thrust may be set to protect tools. Will not surge at break point.
- **FEED CONTROL** Infinitely variable and positive feed rate.
- **RAPID APPROACH AND RETURN** Variable irrespective of RPM.
- **MICRO DEPTH CONTROL** Depth will repeat within .0005 inch.
- **EMERGENCY QUILL RETURN** Button on front of unit. Aid in setting tools.
- **COOL OPERATION** Low volume high pressure hydraulic pump used on power stroke only. Air power used for rapid traverse.
- **PRODUCTION MACHINE** Mount in any position. Quiet operation. Self lubricating.

DRILLMATION

DRILLMATION CO.
6500 E. ELEVEN MILE ROAD
CENTER LINE, MICHIGAN
JEfferson 9-2030

CIRCLE INFORM-A-GRAM KEY NO. 1682

No. 5



WRITE FOR DESCRIPTIVE CIRCULAR

J. A. RICHARDS COMPANY

Multiform

BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air or hydraulic models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛" x 1½" as illustrated. Punching dies available. Other models up to ½" x 8" hydraulic operated. Ideal for steel rule die forming.

ALSO AIR OPERATED MODELS

KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1683

PUBLICATION PREVIEWS

CATALOGS • BULLETINS • SPECIFICATIONS

Circle Inform-A-Gram key number on postage-free Reader Service Card for your request.

A 20-Page Catalog shows the advantages of rolling threads from the end of the workpiece with self-opening thread rolling heads. These heads can be used on either rotating or non-

rotating spindle machines. Capacities and typical installations are found in Catalog NAF-57A from The National Acme Co., 170 E. 131 St., Cleveland 8, or —
Circle Inform-A-Gram No. B1.

Hydraulic Presses are offered in a bulletin which contains descriptions of the features of this line. A specifications chart of the different models is included, along with diagrams of the presses. Copies of this bulletin can be obtained from A. Dale Herman, Inc., 17071 Ventura Blvd., Encino, Calif., or — **Circle No. B2.**

A Transflex Feed Mechanism for automating lines of small presses is presented in a catalog. This Transflo feed will transfer small workpieces through a single press or through a line of up to six presses. Other features and explanations of installation and mechanism are discussed in the Bulletin SB33.59 from Clearing Machine Corp., Div'n of U. S. Industries Inc., 6201 W. 63 St., Chicago 38, or — **Circle No. B3.**

Rubberized Abrasives for deburring, smoothing, and polishing applications are covered in an industrial catalog from Cratex Mfg. Co., 1600 Rollins Rd., Burlingame, Calif. Application information, operating instructions, and tables are included. The catalog is available from the company, or — **Circle No. B4.**

Chucks, Collets, and Chucking Equipment are explained in a 26-page catalog which also gives dimensions and features. The special service department for reconditioning these chucks is also discussed. Request Catalog 1117-C from Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis., or — **No. B5.**

Design, Fabrication, and Construction facilities for heavy-duty special machine and automatic equipment are discussed in a bulletin. For more information write to the Special Machine and Fabrication Div'n, Composite Forgings, Inc., 1469 E. Atwater St., Detroit 7, for a copy of the 12-page brochure, or — **No. B6.**

The Perkins Machine Company announces a heavy duty deep throat press. Outstanding features include 36" depth of throat, 4" diameter shaft at pin bearing, 24 x 16 Bed Area, 14" open height, and alloy cast frame. The press carries a 750 pound 38" flywheel and total weight is 11,000 pounds. Available in plain and geared models and with pin or air clutch.

PERKINS MACHINE COMPANY
Tel. HEMlock 6-7771
20 PERKINS STREET, WARREN, MASS., U.S.A.

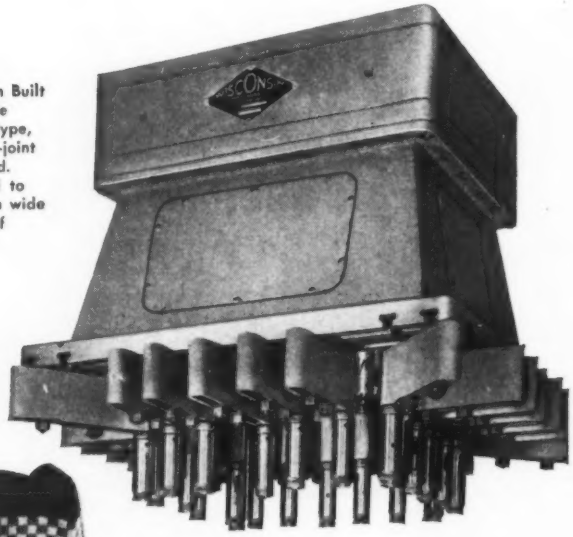
CIRCLE INFORM-A-GRAM KEY NO. 169

X-Press Taps can form internal threads without cutting in copper, brass, zinc, aluminum, die castings, lead, and leaded steels. A bulletin gives advantages, specifications, and types for correct application. Contact Besly-Welles Corp., S. Beloit, Ill., for your copy, or — **No. B7.**

"Standard Attachments for Cincinnati Grinding Machines" is a bulletin which presents information on Centertype centerless grinding machines and attachments. A live spindle headstock, a quick change adapter, an automatic infeed, a power transverse footstock, and an automatic wheel balancer are among the items discussed. For catalog G-701, write Cincinnati Milling Machine Co., Cincinnati 9, or — **Circle No. B8.**

Interchangeability of Heads, columns, and tables on C-Model Rigidmils are possible because the parts are self-contained units. Specifications, information on table cycles, and a list of optional attachments are discussed in a bulletin from Sundstrand Machine Tool Co., Rockford, Ill., or — **Circle No. B9.**

• Custom Built 24-spindle bracket type, universal-joint drill head. Designed to process a wide variety of parts.



Need Special Heads?

...come to WISCONSIN!

All fixed-spindle drilling and tapping heads are specially engineered to customers' specifications by Wisconsin. So are bracket type, universal-joint heads, as pictured above. For competent engineering counsel and experienced technical assistance on your drilling and tapping operations, you can come to Wisconsin with complete confidence.

Visit Our Booth No. 1760 A.S.T.E. Show, Philadelphia, May 1-8, 1958

WISCONSIN DRILL HEAD CO.

4975 N. 124th STREET • BUTLER, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 170

Carbide Cutting Tools are covered in a catalog which lists specifications for reamers, end mills, drills, and files. Included is a section on special tools and their applications. All

tools are ground with a micro-finish edge that gives longer cutting life. Catalog 12 may be requested from Dixie Tool Industries, 4555 W. Franklin Ave., Bridgeport, Mich., or — **Circle Inform-A-Gram No. B10.**

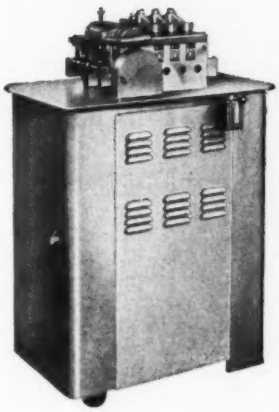
Steps in Spinning a Cone, hemisphere, and cylinder, and how the process is done, are contained in a new bulletin. Shapes suited to spinning, required tooling, and a chart showing the comparison of spinning and pressing a typical part are included. C. W. Torngren Co., 236 Pearl St., Somerville 45, Mass., has published the bulletin, or — **No. B11.**

A Precision Boring Machine admirably suited to difficult turning, boring, and facing operations is covered in a bulletin, which gives a list of specifications and advantages of this boring machine. Write to Jones & Lamson, Springfield, Vt., for a copy of the bulletin, or — **No. B12.**

Eccentric-Gear, Straight-Side Presses, designed for deep drawing and other heavy-duty applications, are covered in a bulletin. Design information, specification tables, and construction details are included. Hamilton Div'n, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio, furnishes Bulletin 13301, or — **Circle No. B13.**

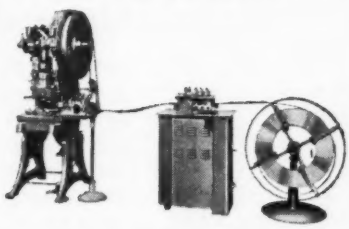
Hydraulic Lift Tables are highlighted in a bulletin which explains how problems of lifting, feeding, and work positioning may be simplified. Complete information and specifications for the four basic series of lift tables, and typical adaptations of standard models, are given. Southworth Machine Co., Portland, Me., has released the booklet, or — **Circle Inform-A-Gram No. B14.**

FLEXIBILITY
in Stock Straightening



WITTEK
STOCK STRAIGHTENERS

Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.



This typical Wittek automatic production feeding setup includes—Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

Write for full particulars

WITTEK Manufacturing Co.

Production Feeding Equipment

4323 W. 24th Place • Chicago 23, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1711

NOW...cut thousands of fine-pitch threads without breaking taps!

Increase accuracy and production with...

NEW Scully-Jones reversible "SAFE-TORQUE" TAP DRIVER *combines...*

RELIABLE RELEASE at the right torque every time...

U. S. Patent Nos. 2,771,804 2,775,326 2,791,304 2,819,635 Other Patents Pending

For Nos. 2 to ¼" tap range right-hand taps only

with FRICTION-FREE overrunning roller drive

PROLONGS TAP LIFE—Gives you reliable release . . . precise control over torque. Releases instantly and completely below break strength of the tap. Preset torque release remains constant because sliding friction and heat are eliminated.

REDUCES MAINTENANCE—All contacting driving members roll on each other . . . eliminating heat and wear. Gear-type reversing mechanism requires no adjustment . . . produces little or no heat and is under load only when reversing.

INCREASES PRODUCTION—Operators gain confidence and step up machine speeds because there's no noise, vibration, or impacting. There's no slowdown for blind holes, no downtime for repairs.

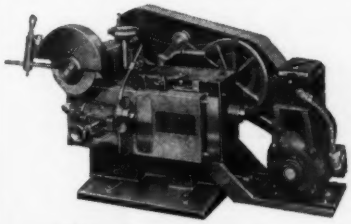
PRODUCES BETTER THREADS—There's no thread distortion due to impacting or vibration. Driver starts releasing when taps get dull, preventing production of undersized threads. Tension spring permits tap to float in and out of hole . . . follows own lead without distorting threads.

ASK FOR FREE DEMONSTRATION—Your Scully-Jones representative or distributor has a sample reversible "Safe-Torque" tap driver with him to demonstrate on your "problem" jobs. Call him or write us: Scully-Jones and Company, 1913 S. Rockwell Street, Chicago 8, Illinois. For more information, ask for new supplement to Bulletin No. 20-50.

SCULLY JONES PRECISION HOLDING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1712

CUT MAINTENANCE COSTS WITH WARDWELL "35T" GRINDER



This money saving machine sharpens metal saws in gangs — as many as 150 saws .015" thick at one time, including slitting and screw slotting saws and milling cutters up to 5½" diameter. Completely automatic. Just start machine — it does the rest.

Save money and make money with a Wardwell 35 T Saw Grinder.

Write for Bulletin 35 T

WARDWELL

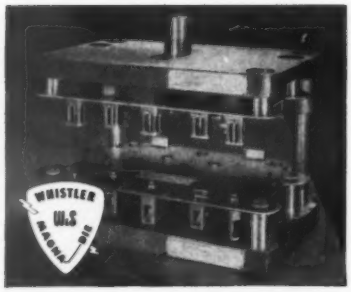
3809 Ridge Road Cleveland 9, Ohio

MAKER OF LARGEST LINE OF SAW AND TOOL SHARPENING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 1713

OVER $2500 SAVED

on 4 stamping jobs with WHISTLER MAGNA-DIES



1

Custom Die $925*
Orig. Magna-Die ... 819
SAVINGS $106

2

Custom Die..... $1100*
Magna-Die Parts. 390
SAVINGS..... $710

3

Custom Die..... $1040*
Magna-Die Parts. 247
SAVINGS..... $793

4

Custom Die..... $1089*
Magna-Die Parts. 164
SAVINGS..... $925

*Custom Die prices estimated

...continued savings with each succeeding job!

GET COMPLETE DETAILS BY WRITING FOR CATALOG M-1955

S. B. WHISTLER & SONS, Inc.

748 MILITARY ROAD, BUFFALO 23, N. Y.

Manufacturers of Adjustable, Magnetic and Custom Built Dies for All Industry

Representatives in Major Cities

S. B. WHISTLER & SONS, INC. • 748 Military Rd., Buffalo 23, N. Y.

Mail your illustrated Magna-Die Catalog M-1955 to us at once.

NAME _____ TITLE _____

COMPANY _____

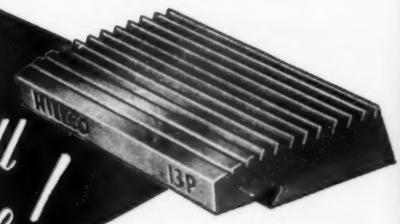
STREET _____

CITY _____ ZONE _____ STATE _____

CIRCLE INFORM-A-GRAM KEY NO. 1721

"HILLCO" TANGENT CHASERS

We think you'll agree!



The new line of "HILLCO" Tangent Chasers, which can be re-ground for 80% of their original length, are guaranteed to be of highest grade tool steels ground to exacting tolerances. We feel that this complete line of chasers are the finest that we have produced in our 75 years of cutting tool manufacture. We think that you will agree with us.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION

1203 West 65th Street • Cleveland 2, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1722

FREE... 64 PAGE CATALOG

WORLD'S LARGEST LINE OF WORK HOLDING EQUIPMENT—CHUCK JAW BLANKS, CAST ALUMINUM AND MALLEABLE KNOBS, WHEELS, HANDLES—PLUS HUNDREDS OF OTHER JIG AND FIXTURE COMPONENTS

COMPLETE DETAILED SPECIFICATIONS

ENGINEERING DRAWINGS • COST SAVING DATA

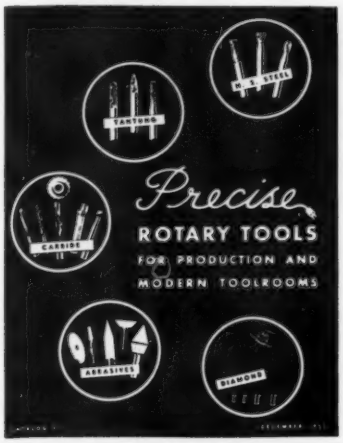
write for your copy—TODAY!

JERGENS TOOL SPECIALTY CO.

Dept. TP-4 712 E. 163rd St., Cleveland 10, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1723

A New 48-Page Rotary Tool Manual offers every type of rotary cutting tool from high speed steel to carbide, abrasive, and diamond. The manual is designed to help users



select correct tools for particular job applications. Write to Precise Products Corp., Racine, Wis., for Catalog F-7, or — **Circle No. B15.**

Straighteners for flattening ferrous and non-ferrous metal in sheet or strip stock are highlighted in a bulletin. The different models of machines are discussed, and their features and specifications included. Special straightening units are also offered. Write to The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., for copies of Catalog 820-T-5, or — **Circle No. B16.**

"How to Assemble Cone-Drive Double Enveloping Gears" is the title of a bulletin which explains how to adjust a set of double-enveloping worm gears accurately with no more than a set of feeler gages or a dial indicator. Cone Drive Gears, Div'n of Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, will send copies of Bulletin CD-575 on request, or—**Circle Inform-A-Gram No. B17.**

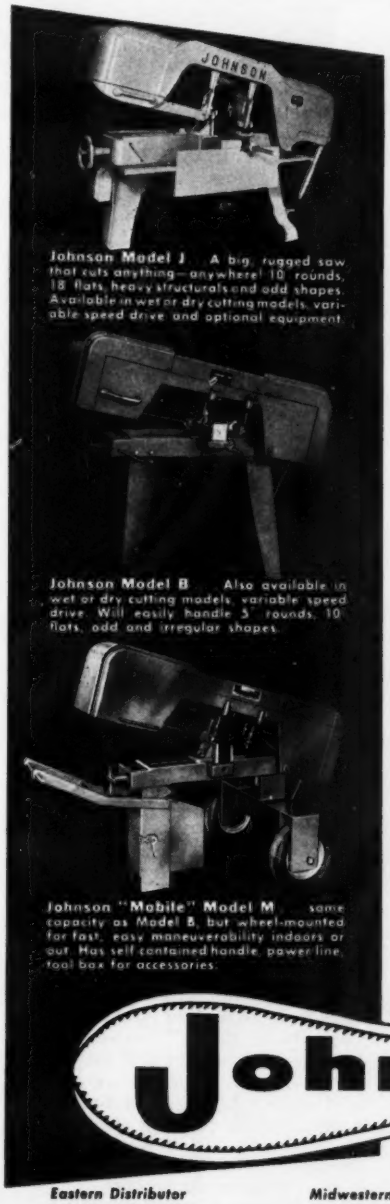
High-Torque Screwdrivers are described as lightweight, powerful, and versatile in a bulletin from Millers Falls Co., Greenfield, Mass. Applications and dimensions of these tools and a list of available accessories are also given in Bulletin E-SD8-1, or — **Circle Inform-A-Gram No. B18.**

A New Kendex Tooling Catalog includes 42 styles and 220 different holders for throwaway carbide inserts. They include negative and positive rake tools, roller turner tools, boring bars, and heavy-duty tools. The Catalog B-305 is now being distributed by Kennametal Inc., Latrobe, Pa., or — **Circle No. B19.**

A 40-Page Standard Fastener Catalog has been released by Abbott Screw & Bolt Co., 1728 W. Walnut St., Chicago 12. This catalog lists, with quantities available, the thousands of fasteners Abbott stocks. Contact the company for copies of this catalog, or — **Circle No. B20.**

"Recommendations for Modernization and Conversion of Straight Side and Gap Frame Double Crank Presses" shows how to bring old presses up to date. Diagrams show before and after versions of power slide adjustment, driveshaft roller bearing installation, pneumatic type slide counterbalance, etc. E. W. Bliss Co., 1375 Raff Rd., S.W., Canton, Ohio, will supply Bulletin 46, or — **Circle Inform-A-Gram No. B21.**

A 24-Page Booklet gives information on the complete line of Wright Frame 2 and Frame 3 electric hoists. Construction features of the units' internal mechanisms are explained with detailed diagrams. Contact Wright Hoist Div'n, American Chain & Cable Co., Inc., York, Pa., for a copy of Catalog E-58, or — **No. B22.**



Johnson Model J A big, rugged saw that cuts anything—anywhere! 10" rounds, 18" flats, heavy structurals and odd shapes. Available in wet or dry cutting models, variable speed drive and optional equipment.

Johnson Model B Also available in wet or dry cutting models, variable speed drive. Will easily handle 5" rounds, 10" flats, odd and irregular shapes.

Johnson "Mobile" Model M same capacity as Model B, but wheel-mounted for fast, easy maneuverability indoors or out. Has self-contained handle, power line, tool box for accessories.

MORE SAW for LESS MONEY

Only Johnson offers so much saw for so little money. Whether your requirements call for the tremendous performance of the big Model J, the amazing Model B, or the versatile "Mobile" Model M, there's a Johnson saw model, wet or dry, to match your metal cutting needs.

Remember...Johnson offers three husky, handsome models that'll do the job faster, better. They're beautifully engineered, semi-automatic, have centralized controls—plus many exclusive features that pay production dividends to *you!*

Priced right? Certainly! Compare them all before you buy and you'll agree, Johnson offers more saw for less money.

Write today... **Ask for illustrated literature, specifications and prices on the full line of Johnson saws. Ask the man who has one... You'll be glad you did!**

JOHNSON
MANUFACTURING CORPORATION
Barnes Street, Albion, Michigan

Johnson
METAL CUTTING BAND SAWS

Eastern Distributor	*Midwestern Distributor*	*Western Distributor*
R. J. R. KELLY CO.	**W. Q. LUNDMARK**	**HASTINGS DISTRIBUTORS**
Hale Bldg., 51 Main St.	75 N. Broadway	1605 Solano Avenue
East Orange, N. J.	Des Plaines, Ill.	Berkeley, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 173

"Die Handling Equipment" contains information on four Shoplifters and elevating tables. Ranging in capacities from 500 to 2,000 lbs, this equipment has optional accessories which include a die separator and a die pulling winch for one-man handling of dies and molds. The folder is made available by Economy Engineering Co., 4509 W. Lake St., Chicago, 24, or — **Circle No. B23.**

Mechanical Finishing Processes are explained in a publication from Roto-Finish Co., Kalamazoo, Mich. In addition to describing Roto-Finishing equipment, the catalog discusses how the process is applied to the grinding, deburring, descaling, polishing, and coloring of metal parts. Get this bulletin from the company, or—**Circle Inform-A-Gram No. B24.**

Gulfcut Cutting Oils are listed in a brochure prepared by Gulf Oil Corp., Gulf Bldg., Pittsburgh 30. The list includes types for every cutting need, which are compounded to meet the most exacting requirements for tool life, machining efficiency, and surface finish. Get a copy from the company, or — **Circle No. B25.**

REDUCE

Precision Hole Grinding Costs

USING AN

Onsrud®

D1-S

HOLE GRINDER

MOUNTED ON YOUR

OR MOUNT ON JIG BORER TO CONVERT MACHINE TO PRECISION JIG GRINDER

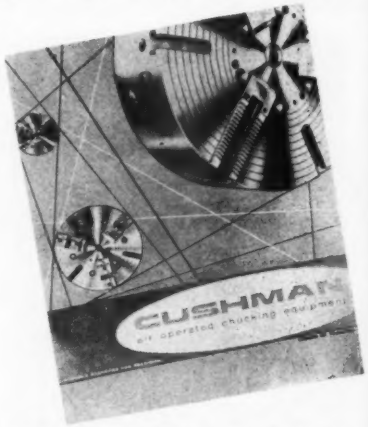
Grind precision holes at amazingly low costs with the D1-S . . . using your present machine tools. A completely RIGID unit guaranteed not to deflect in its vertical alignment. Grease-shielded, long life bearings. Capacity up to 2¾" diameter with ¾" wheel . . . and up to 4" diameter with adapter. Proper high speed and power for dependable, fast operation with toughest steels.

ONSRUD MACHINE WORKS, INC.
PORTABLE TOOL DIVISION
3941 PALMER ST., CHICAGO 47, ILL.

WRITE FOR FREE D1-S HOLE GRINDER BULLETIN 1126

CIRCLE INFORM-A-GRAM KEY NO. 174

Air Operated Chucks, Cylinders, and accessory equipment are discussed in a condensed catalog which gives specifications and diagram



drawings of screw-adjustable jaw chucks, wedge-operated chucks, compansating jaw chucks, and collet chucks. Copies are supplied by The Cushman Chuck Co., Hartford 2, Conn., or — **Circle No. B26.**

Socket Screws made self-locking by means of a nylon pellet inserted in the threaded section, are described and illustrated in a bulletin. Data on standard sizes, Rockwell "C" hardness, and tips on applications are given for socket head cap screws, button head socket screws, etc. Direct requests for copies of this bulletin to Cleveland Cap Screw Co., 4444 Lee Rd., Cleveland 28, or — **Circle Inform-A-Gram No. B27.**

"S-2" Cylinders are offered in a bulletin which gives dimensions for the 11 models of the series, and includes all data needed for mounting. Nine standard bore sizes are available, ranging from 1½" to 8". Hydro-Line Mfg. Co., 5600 Pike Rd., Rockford, Ill., supplies Bulletin SS-58, or **Circle Inform-A-Gram No. B28.**

Plunge Turning and Facing, and tracer-lathe operations can be done with the throwaway insert holders highlighted in several technical bulletins. They give dimensions, characteristics and suggested uses. Write to Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, for bulletins 1357, 1457, and 1557, or — **Circle Inform-A-Gram No. B29.**

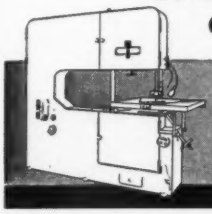
12¾" Work Height, using a 7" wheel, and solid one-piece construction of spindle housing and vertical slide, are features of a 6" x 12" surface grinder. Other features and specifications are given in a technical bulletin available from Harig Mfg. Corp., 5751 W. Howard St., Chicago 31, or — **Circle No. B30.**

FRICTION SAWING with Tannewitz HIGH SPEED BAND SAWS

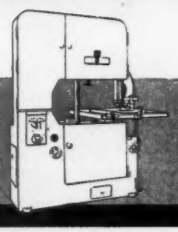
FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN ☎ GL-6-1729



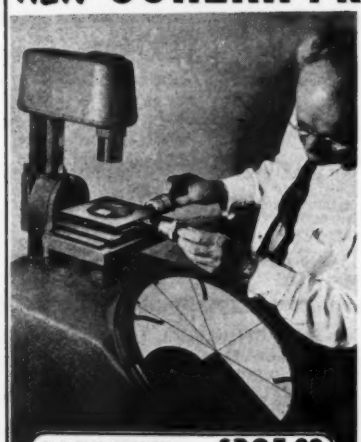
TANNEWITZ DI-SAWS — 24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



CIRCLE INFORM-A-GRAM KEY NO. 1751

INSPECTION BY PROJECTION

with the NEW SCHERR MICRO PROJECTOR with the VERTICAL DESIGN



NEW IMPROVED *Self-Contained* MODEL featuring

Rigid Floor Base — eliminating extra charge for table
Tilting Stage for Helix, Angles and Bevels
4" Dia. Stage Opening
14" Diameter Screen
Column Slide adjustable for wear by means of gibs. Will hold square indefinitely.
Custom made Precision Coated Lenses and double condensers for different objectives 10 to 100X magnification.
Surface Illuminator can be added anytime.
An entirely new practical designed tool for Inspection Department and Production Shop.

WRITE FOR ILLUSTRATED FOLDER CODE GHJT

BASIC PRICE . . . $395.00

SCHERR PRECISION COMPARATOR CHARTS
OVERLAY and REPLACEMENT STANDARD CHARTS are carried in stock.
SPECIAL CHARTS made up to your specifications.

GEO. SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS
200 T LAFAYETTE STREET • NEW YORK 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1752

FREE NEW-16 PAGE CATALOG
WRITE FOR YOUR COPY TODAY

JIG AND FIXTURE COMPONENTS
LATCH BOLTS
CAST IRON HAND KNOBS
ALUMINUM HAND KNOBS
QUARTER TURN SCREWS
SHOULDER SCREWS
JIG FEET (3 TYPES)
SPHERICAL WASHERS
FIXTURE KEYS
KNURLED HEAD SCREWS
TOGGLE SHOE CLAMPS & V-PADS

HOLD DOWN AND CLAMPING TOOLS
T-NUT & STUD SETS
STEP BLOCK & CLAMP SETS
FLANGED NUTS
CUT THREAD STUDS
TEE NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STRAP CLAMPS (PLAIN & STEP TYPE)

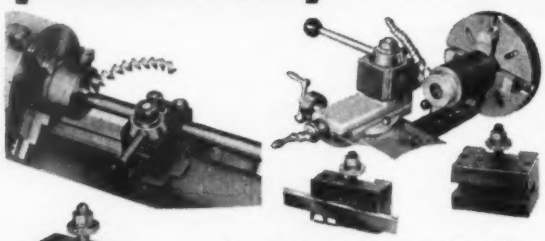
CATALOG INCLUDES TRACING TEMPLATES

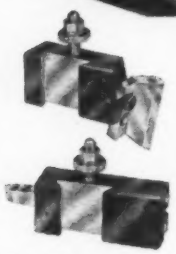
Northwestern NORTH WESTERN
116 HOLLIER AVE., DAYTON 3, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1753

YOUR LATHES "TURN OUT" BIGGER PROFITS

WITH ALORIS QUICK CHANGE TOOL POSTS & TOOL HOLDERS





Change tools instantly—for turning, facing, drilling, boring, threading, knurling, cutting off or any operation.

- Maximum Repetitive Accuracy Assured
- No Shims . . . No Time Wasted
- Unlimited Versatility
- Saves 90% Set-up Time, 50% Production Time
- Greater Rigidity
- Leading Lathe Mfrs. Recommend It
- Sizes to Fit Every Lathe
- Unconditionally Guaranteed

NEW! Aloris Holder for Carbide Triangular Inserts.

Greater rigidity, versatility, efficiency & economy

Write For Catalog & Price List

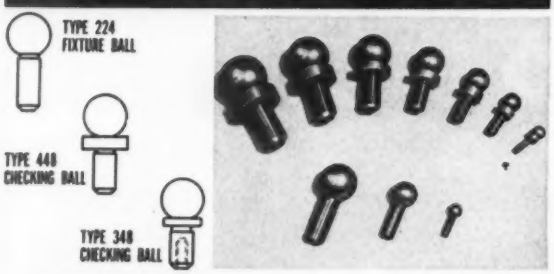
ALORIS TOOL CO., INC. 419 Getty Avenue Clifton, New Jersey

See Us At Booth 2045, A.S.T.E. Tool Show

CIRCLE INFORM-A-GRAM KEY NO. 1761

High-Precision Stainless Steel

TOOLING BALLS



- For gage, jig and tool work. Center of ball provides positive reference point for work in any plane.
- Highly accurate. Ball size held to ±.0001" for fixture balls; ±.00002" for checking balls.
- Durable; corrosion-resistant. Made of Type 440-C stainless steel, hardened to 55-58 Rockwell C.
- In stock: Types 224 and 448 in 7 ball sizes, ¼" through 1" by ⅛" steps; Type 348 with ½" ball and 6-32 tapped shank. Other sizes to order.

WRITE FOR price list and ASTE Data Sheet.

INDUSTRIAL TECTONICS, Inc.

3681 Jackson Rd., Ann Arbor, Michigan
18313 Santa Fe Ave., Compton, California

PRECISION BALLS OF ANY SIZE OR MATERIAL
ANTI-FRICTION BEARINGS FOR SPECIAL REQUIREMENTS
TOOLING BALLS — MASTER BALLS — SPHERICAL FINISHING

CIRCLE INFORM-A-GRAM KEY NO. 1762

HUPPERT KH 1200 LABORATORY OVEN

UNDERWRITER'S LABORATORY APPROVED MODEL

Equalized Oven Heat at all times

Results from Huppert Ovens Are Always Accurate. Thermostatic control accuracy ½ of 1° C. at any setting up to 425° F. — 220° C. This is achieved by an efficient venting system for constant dispersion of fumes and other exhaust air, permitting a cleaner operation and better distribution of heat. Work chamber is stainless steel 12" W. x 10" H. x 10" D.

$100.00
Complete with thermostatic control and heat range switch

All Stainless Steel
$130.00
(Thermometer $5.00 extra)

HUPPERT 5700 SERIES OVEN

with 3-way Heat Range Switch

Inside Dimensions			Wattage	Temp. Range	Price
Wide	High	Deep			
20"	15"	19"	Max. 2250	130°F. to 550°F.	$210.00

20-hour electric timer—$20.00 additional

Write for literature

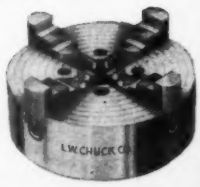
K. H. HUPPERT CO.
Manufacturers of Electric Furnaces and Ovens
6820 COTTAGE GROVE AVE. CHICAGO 37, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1763

Only LW could be expected to bring you such VERIFIED VALUE, PEAK PRECISION AND ACCURACY

THE NEW LW LATHE CHUCKS

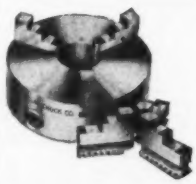
Heavily ribbed, semi-steel cast body withstands unusual stress.
Ground face and outside diameter.
Solid steel hardened and ground jaws.
T Hand Wrench included.



4-JAW INDEPENDENT CHUCKS

6" — 8" — 10" — 12" — 14"

Reversible jaws, wide gripping surface. Tough, oversize hardened alloy steel screws with accurately cut square threads.
Hardened alloy steel anchor bearings withstand maximum pressure.



3-JAW UNIVERSAL CHUCKS

For light or heavy duty work. Guaranteed to run true for lathe or screw machine work.
6", 8" and 10" sizes come complete with two sets of accurately fitted jaws, male and female. 5" size has body threaded 1½" x 8, (or can be furnished for use with adapter plates) and comes with one set of 3 reversible jaws.
One high grade hardened steel pinion used on 5", 6", and 8", 3 on 10" size.
Special alloy scroll.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 72 SO. ST. CLAIR ST TOLEDO 4 OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1764

Coil Stock Users can select coil stock handling equipment from a condensed catalog which gives features of all types of equipment for handling, reeling, straightening, and

feeding coil stock and winding of scrap. Direct requests for copies to F. J. Littell Machine Co., 4101 N. Ravenswood Ave., Chicago 13, or — **Circle Inform-A-Gram No. B31.**

High Speed and Carbide Cutting Tools are engineered and produced by Ruthland Tool Service, 1617 E. McNichols, Detroit 3. This service is described in a bulletin which also tells how the company can alter or convert old tools to new ones. Write for this bulletin, or — **Circle No. B32.**

Electropoint Tape Controlled Drilling, tapping and boring machines are described in a bulletin. It explains how the machine is operated and controlled, and how to make up a blueprint, program a part, punch the tape, and put the work onto the machine. Contact Burg Tool Mfg. Co., Inc., 15001 S. Figueroa St., Gardena, Calif., or — **Circle No. B33.**

18" Royal Drills — bench, floor, and multi-spindle models with sensitive hand or power feed — are pointed out in a catalog. Geared power feed electrical controls, new depth dial, and full-floating spindle are some of the features discussed. Catalog D-136 is issued by Cincinnati Lathe and Tool Co., Cincinanti 9, or — **Circle No. B34.**

7,000 Stainless Steel Fasteners stocked by Star Stainless Screw Co., 655 Union Blvd., Paterson 2, N. J., are covered in a bulletin. Included are hex head cap screws, hex nuts, milled hex machine screw nuts, slotted sheet metal screws, and socket set screws. Ask for this bulletin, or—**Circle Inform-A-Gram No. B35.**

V-R Face Mill Cutters for throwaway inserts are discussed in a bulletin which gives specifications for both the negative and neutral rake, and right- and left-hand styles. These cutters will fit both "C" arbors and spindle nose. Write to Vascoloy-Ramet Corp., Waukegan, Ill., for Bulletin 5801, or — **Circle No. B36.**

Applications of the Roto Recipro toolmaking machine in extrusion dies, tungsten carbides, carbide form cutting tools, and other types of tools and dies are discussed in a bulletin. Tension filing, machining punches, and machining with fine grit grinding point are discussed. Obtain this catalog from Connecticut Tool & Engineering Co., Round Hill Rd., Fairfield, Conn., or — **Circle No. B37.**

200,000 Items/Hr can be fed, orientated, and counted with the Hoppermatic. The hopper, feed-track, and release control are engineered to operate with parts of many sizes and shapes. More information on advantages and specifications is contained in a bulletin from U. S. Engineering Co., 40-24 22nd St., Long Island City 1, N. Y., or — **No. B38.**

New way to buy the finest drills made!

NEW ACE TAPER LENGTH DRILL SETS

THREE EXCLUSIVE *NEW* STANDARD STOCK DRILL SETS SUPPLIED IN CONVENIENT *NEW* FOLDING INDEX CASES AVAILABLE NOW AT *NEW* LOW MONEY SAVING PRICES!

- They're made of top quality high speed steel heat treated in continuous mill length bars to assure the ultimate in uniform hardness, extra toughness.
- They're ground-from-the-solid *after* hardening by special Ace-originated processes which produce more highly polished flutes plus keener, stronger cutting edges . . . finer, longer lasting drills.

Call your local distributor or write direct today for details on this NEW WAY TO BUY THE FINEST DRILLS MADE!

ACE DRILL
ADRIAN, MICHIGAN
Originators of Ground-from-the-Solid High Speed Steel Drills

Taper Length Drills	Stub Length Drills	"Hi-Brinell" Drills	Carbide Tipped Drills
12" - 18" Longboy Drills	Heavy Duty Drills	Solid Carbide Drills	Step & Subland Drills
Hardened H.S.S. Blanks	Slow Spiral Drills	Taper Shank Drills	"L" & "M" Plastic Drills
General Purpose Drills	Fast Spiral Drills	Chucking Reamers	Drill Length Reamers

CIRCLE INFORM-A-GRAM KEY NO. 177

Lift, Slide, and Lock are the simple steps for clamping the speed vise. A bulletin discusses other features of the vise, which will accommodate a wide variety of parts. Typical examples and standardized construction features are also included. Get your copy of Bulletin 25 from Cardinal Machine Co., 1819 Dana St., Glendale, Calif., or — **Circle No. B39.**

Technical Data on Carbide Drills, reamers, and end mills are included in a 32-page catalog from Greenfield Tap and Die Corp. Application and resharpening of carbide twist drills and reamers are discussed and illustrated with detailed diagrams. Get your copy of this catalog from Greenfield Tap and Die Corp., Greenfield, Mass., or — **Circle No. B40.**

A Condensation of the American Standard Identification Code for diamond wheels is presented in a bulletin. In addition to a complete listing of wheels and hones, there are recommendations for selection, care, and use to cut carbide grinding and lapping costs. Catalog 957 is issued by The United States Diamond Wheel Co., Aurora, Ill., or — **No. B41.**

MICRO-HEIGHT® GAGE SIMPLIFIES

layouts and inspections

Ends vernier reading problems. Combination of direct reading from zero at base...plus quick and easy movement, saves times, reduces errors, increases accuracy.

1 **Micro-Height Gage reads faster than vernier-type gages.** Eliminates need for eye loupe. Hundredths on big barrel... thousandths on easy-to-read thimble. Box at left shows ease-of-use for fast layout.

2 **Quickly reversing scriber** by putting it at top of support adds 1" to capacity. You get 3" direct range with Micro-Height "2"; 5" range with Micro-Height "4". To increase capacity up to 6" more, screw lapped Riser into gage base.

3 **For fast, accurate inspections** – replace Scriber with your present dial indicator. Now, by rotating thimble, you can quickly read distances between heights or holes without removing gage from surface plate.

Micro-Height "2" (3" range) **$36.50**
Micro-Height "4" (5" range) **$57.00**

Accuracy ±.0003". Simple adjustments to maintain accuracy. Rustproof satin-chrome finish.

Accessories
Scribers: steel or carbide tip • **Dial-indicator Holder**
Risers: 1, 2, 3, 4, 5 and 6 inches • **Plush-lined Cases**

Call your **GREIST** *distributor or write*
THE **GREIST** MANUFACTURING COMPANY, 484 BLAKE ST., NEW HAVEN 15, CONN.
Precision Products since 1871
CIRCLE INFORM-A-GRAM KEY NO. 178

An Electric Comparator manufactured by Threadwell Tap & Die Co., Greenfield, Mass., is described in a bulletin. Included are specifications

and special features of this instrument, which is used for quick, accurate on-the-job gaging to 0.00002". Request your copy of Bulletin T-250 from the company, or — **No. B42.**

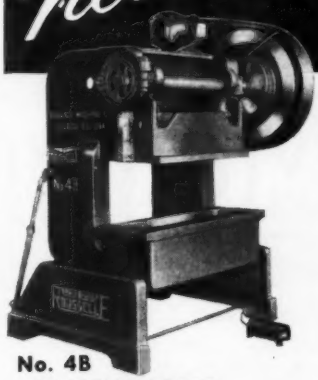
Load, Remove, and Transfer Any Part into, from, or to any type punch press with the Press-Matic automation unit. It is completely portable, self-contained, adjustable, and pneumatically-powered. Detailed diagrams and special features of the press feeders are included in a bulletin from Die and Automation Inc., 1490 Edison Ave., Hamilton, Ohio, or—**Circle Inform-A-Gram No. B43.**

Infinitely Variable Speed Drives are among the featured products in a bulletin which tells how these drives will produce increased torques at either maximum or minimum speed. Also presented are systems for automatic control of speed. Graham Transmissions Inc., Menomonee Falls, Wis., will supply Bulletin 550, or — **Circle No. B44.**

A Machine Tool Catalog, released by Famco Machine Co., 3100 Sheridan Rd., Kenosha, Wis., has special sections on power presses, arbor presses, drill presses, band saws, foot presses and squaring shears, and milling machines. Get a copy of the condensed catalog from the company, or — **Circle No. B45.**

Adjustable Boring and Reaming Tools are listed in a catalog which gives specifications of the tools and includes a grinding chart for the cutters. Advantages of these tools, and diagrams of special designs, are also covered. Get your copy of this bulletin from Maxwell Industries, Inc., Ashtabula, Ohio, or—**Circle No. B46.**

New 40-TON DOUBLE CRANK O. B. I.
ROUSSELLE



No. 4B
ROUSSELLE PRESS

WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES

SERVICE MACHINE CO.
Mfrs. of Rousselle Presses
2310 WEST 78th STREET • CHICAGO 20, ILL.

ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS
CIRCLE INFORM-A-GRAM KEY NO. 1791

REID TOOL ROOM *Accessories*

MALLEABLE MACHINE HANDLES

Made in straight, crank and offset as shown. Finest on the market. Large variety of sizes. Designed to withstand severe usage. Neat in appearance. Finished ready for use. Moderate in cost.

THE REID LINE
Includes scores of other tool room needs such as plastic and steel ball handles, C.I. hand knobs, C.I. hand wheels, compression springs, balanced cranks, clamping levers, etc.

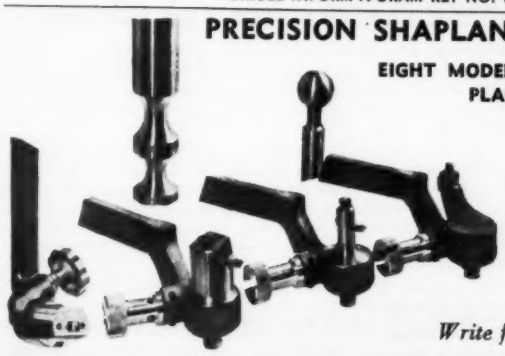
Quality at Moderate Prices!

FREE 74 Pg. CATALOG

REID TOOL SUPPLY CO. Muskegon Heights, Mich.
CIRCLE INFORM-A-GRAM KEY NO. 1792

PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS



Range: 3/8" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

Write for circular

Patent Pending

C. B. TEETER - Tool Room Specialties
1221 W. Addison St., Chicago 13, Illinois • Phone DRexel 3-3571
CIRCLE INFORM-A-GRAM KEY NO. 1793

FORD
rotary tools

WHY THEY DO YOUR JOB BETTER

All Ford cutters, High Speed Steel and Carbide, are precision ground on special machinery built by Ford. Ford's machine grinding insures accurate flute form, uniform spacing and maximum concentricity for fast cutting and long life. Try Ford cutters on that tough application.

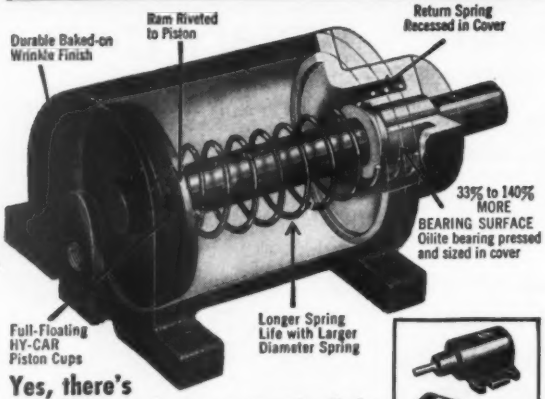
NEW CATALOG
601 FREE AND LATEST PRICES
Rotary FORD Tools
. . . WRITE TODAY

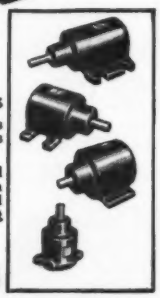
M. A. FORD MFG. CO., INC.
1553 ROCKINGHAM RD, DAVENPORT, IA.

Precision manufacturer of Carbide End Mills • Countersinks • Grinding Burrs • Special Tools • Factory Regrinding

CIRCLE INFORM-A-GRAM KEY NO. 1794

A $32.90 Air Cylinder Can Save You thousands of dollars!


Durable Baked-on Wrinkle Finish
Ram Riveted to Piston
Return Spring Recessed in Cover
33⅓ to 140% MORE BEARING SURFACE Oilite bearing pressed and sized in cover
Longer Spring Life with Larger Diameter Spring
Full-Floating HY-CAR Piston Cups



Yes, there's no doubt that simple, spring-return air cylinders are cheaper to start with, and use only half as much air as double-acting cylinders. The valves and hookups are simpler and cheaper, too.

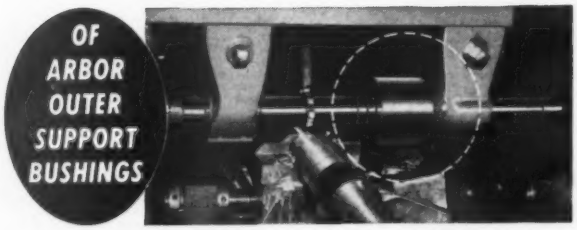
What's more, MEAD distributors carry local stocks for *immediate* delivery in six bores from 1" to 6", six stroke lengths from ½" to 3", and three mountings. Write now for single-acting cylinder catalog HA-48.

MEAD

SPECIALTIES CO., 4114 N. Knox, Dept. HA-48, Chicago 41, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1801

ELIMINATE MILLING MACHINE MAINTENANCE



OFTEN UPS SPEEDS AND FEEDS 200%

Sound too good to be true? Then see how General Electric, Jeffrey Mfg., hundreds of others **absolutely end** arbor bushing maintenance problems and decrease production costs on horizontal milling machines by replacing the bronze outer support bushing with a Jergens "Live" Sealed Roller Bearing Unit as illustrated above. Jergens Units with adjustable roller bearings **hold** precision—permit increases in milling speeds and feeds to take full advantage of carbide cutters. The rigidity of these units increase cutter life and eliminate chatter, frozen bushings, and twisted arbors.

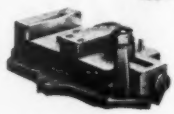
SEE HOW HUNDREDS SAVE THOUSANDS!

WRITE FOR ***FREE*** CASE HISTORIES OF ACTUAL company performance reports of jobs and dollars saved!

DONLEY PRODUCTS, INC.

Dept. TP-4, 11106 Avon Ave. • Cleveland 5, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1802

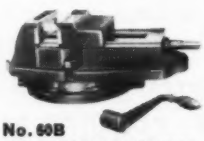


PALMGREN

127

Vises, Rotary Tables, Milling Attachments can speed up production, solve difficult angle jobs.

Used In All Industries... Everywhere



No. 60B SWIVEL MACHINE VISE $99.95

No. 246 ANGLE PLATE $15.85

No. 14 DRILL PRESS VISE $19.95

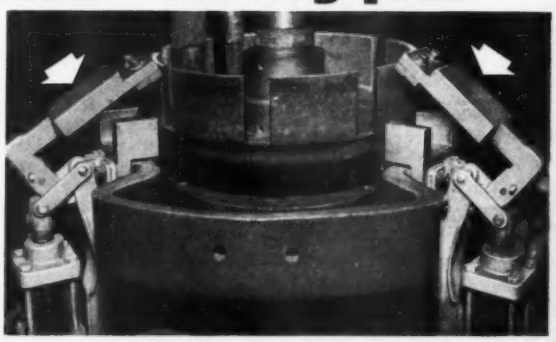
Get this FREE Catalog NOW on work holding tools, showing 68 models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories, with jaw sizes from 1½" to 8" showing details and prices.

No. 84 TILTING, INDEXING and ROTARY TABLE $139.50

CHICAGO TOOL & ENGINEERING CO.
8388 South Chicago Ave., Chicago 17, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1803

BIG--for big jobs



NEVER SEND A BOY—here's the Knu-Vise clamp AO-200.

LAPEER CLAMPS FOR ARC WELDING

In the plant of a midwestern automotive parts manufacturer, air operated Knu-Vise clamps are an important part of a work holding fixture for arc welding. Shown is the operation where center hubs are welded into the high clutch splitter housing for automatic truck transmissions.

No job for a panty-waist, the husky Lapeer clamps have to grab securely—hold rigidly—let go instantly. They are part of a family of more than 150 models of clamps and pliers designed to do a tremendous number of holding jobs. Some are air-operated, others hand operated. All of them do workhorse jobs in industry holding big parts, small parts, unwieldy parts. Write today for more information.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS — LAPEER MANUFACTURING CO.

3064 DAVISON ROAD
LAPEER, MICHIGAN

WESTERN DIV.: ART LEWIS PRODUCTION EQUIP. CO. 419 Magnolia Street, Glendale, California
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD. 1131 Pettit Road, Burlington, Ontario

See Lapeer Exhibit Booth No. 833 A.S.T.E. Show May 1-8

CIRCLE INFORM-A-GRAM KEY NO. 1804

Multi-Press Rivnuts, designed especially for fast arbor press installation, are presented in a bulletin. These Rivnuts provide multiple nut plate, or combination riveted and nut plate, assembly in one easy operation. Obtain the bulletin from B. F. Goodrich Aviation Products, 500 S. Main St., Akron, Ohio, or — **Circle Inform-A-Gram No. B47.**

A New 24-Page Photoelectric Catalog has descriptions and application diagrams of this equipment. Described are normal, high speed, ultra sensitive, and impulse actuated photoelectric controls, and a series of light sources. Autotron, Inc., Box 722GS, Danville, Ill., will answer requests, or — **Circle No. B48.**

Vibratory Bulk Materials Handling Equipment and other products are explained in a catalog. 60 pages of dimensions are given for vibrators, packers and jolters, flow control valves, feeders, lapping and polishing machines, and power tools. Catalog 5712 is compiled by Syntron Co., 341 Lexington Ave., Homer City, Pa., or — **Circle No. B49.**

Manually Operated, 4-Way Hydraulic Valves are covered in a 12-page catalog which describes pipe connected, flange connected, and subplate mounted valves operated by lever, cam, or foot. Specifications pertaining to each operation and mounting style are included in the catalog offered by Rivett, Inc., Brighton 35, Boston, Mass., — **No. B50.**

Magnesium Applications, uses, and advantages are discussed in a booklet from White Metal Rolling & Stamping Corp., 88 Moultrie St., Brooklyn 22, N. Y. It gives details on magnesium's machinability, lightness of weight, weldability, design possibilities, durability, strength, and bulk stiffness. Get a copy from the company, or — **Circle No. B51.**

Controlled Preload through built-in torque control are features emphasized in a bulletin which discusses the Hi-Lok fastener. Tension and fatigue charts and a list of advantages are included. Hi-Shear Rivet Tool Co., 2600 W. 247 St., Torrance, Calif., will issue copies of this bulletin, or — **Circle No. B52.**

Snap Gage Micrometers, direct-reading micrometers, tube micrometers, and micrometer heads are among the line of instruments discussed in a catalog, available from J. T. Slocomb Co., Glastonbury, Conn., or — **Circle No. B53.**

An 80-Page Catalog is devoted to the line of steel roller chains, the heavy series standard pitch chains, the extended pitch series, and attachments. Information on how to determine the chain length and how to lubricate the chains is also included. Write Acme Chain Corp., 821 Main St., Holyoke, Mass., for a copy of Catalog 5, or — **Circle No. B54.**

A New Tape Control System for the production of machined parts is explained in a catalog. The advantages and economies resulting from automating machine tools with this system are discussed. Write to Controls Section, Bendix Aviation Corp., 21820 Wyoming Ave., Oak Park, Mich., for your copy of Catalog BR-1, or—**Circle Inform-A-Gram No. B55.**

An Electronic-Electrolytic Power Supply Unit is ideally suited to large volume work such as surface grinding and cylindrical grinding where wheels from 1" to 3" wide are used. Specifications and features of this unit are given in a bulletin from Anocut Engineering Co., 631 W. Washington Blvd., Chicago 6, or — **Circle Inform-A-Gram No. B56.**

GEM-17 DIAL INDEX TABLE

TRUE GENEVA MOTION

FOR FAST, *ACCURATE* AUTOMATION OF ASSEMBLY *and* MACHINING OPERATIONS

This new, high precision index table is accurate to plus or minus 0.001 in. on a 13 in. dia. work circle; can position work in as little as 1/2 sec.; indexes a 1,000 lb. fixture load.

High volume manufacturers find it versatile in automating drilling, tapping, riveting, spinning, staking, knurling, chamfering, welding and screw driving machines, gaging devices and other operations. GEM-17 builds profits through savings in time, labor and materials.

BASIC SPECIFICATIONS: Standard Number of Stations—6, 8 or 12; 3 and 4 skip. Motor—Rotary air, fluid, or electric. Dial Plate-17 in. dia. standard; larger plates available. Rotation—Either direction. Interlock—Limit switch operated directly off locking bolt. Weight—200 lbs.

Gray engineers will help you adapt GEM-17 to your use. For recommendations, send specifications of your application. Illustrated brochure DI-17 and prices on request.

GRAY EQUIPMENT COMPANY

13600 Ford Road • Dearborn, Michigan • Telephone: Tiffany 6-7573

CIRCLE INFORM-A-GRAM KEY NO. 181

Quality Control and Inspection are facilitated with a line of pneumatic comparator gages outlined in a catalog. Manual and automatic gaging instruments are available, and the catalog gives specifications and diagrams for this easy selection. Write to Moore Products Co., H & Lycoming Sts., Philadelphia 24, or — **B57.**

Single and Double Acting Air Presses are featured in a bulletin which includes explanations of the controls and accessories available. Also included are formulas and charts for figuring the compressor horsepower required and air consumption/minute. Write to Famco Machine Co., 3100 Sheridan Rd., Kenosha, Wis., for copies of this bulletin, or — **Circle No. B58.**

For Positive Staging of Small Parts on all makes of optical comparators, use the holding fixtures described in a bulletin. Specifications, features, and detailed diagrams of the multi-use stages are given. Copies of Bulletin 10M-57 are being distributed by Optical Gaging Products Inc., 26 Forbes St., Rochester 11, N. Y., or — **Circle No. B59.**

for LOW-COST, HIGH-SPEED
PRODUCTION Turning

★ Push Button speed selection

★ Heavy duty power driven variable speed drive

★ Handwheel 6-station, 6½" stroke bed turret

★ Lever-operated cross slide with front and rear tool blocks

★ Lever-operated 1-1/16" draw bar collet attachment (1⅜" hole through spindle)

★ Zero-Precision taper roller spindle bearings

★ 13⅛" swing over bed ways

★ 2-HP Motor

★ Complete Line of accessories and attachments

SHELDON
Precision
TURRET LATHES

An extremely versatile, capable and fast, production tool for turning precision parts. Increases pieces per hour, lowers cost per piece. Lower tool investment, saves floor space, reduces power costs. Easily operated by anyone. Rapidly pays for itself in added profit. The extra capacity makes the lathe ideally suited for either high speed precision collet work or as a chucker.

This tool can be your answer to today's competition.

10", 11" and 13" Sheldon Lathes • Sheldon Variable-Speed Lathes • 13" and 15" Sebastian Geared Head Lathes • Sheldon Milling Machines • Sheldon Shapers.

Write for Turret Lathe Circular and General Catalog

See us at our BOOTH No. 724 ASTE SHOW

SHELDON MACHINE CO., Inc. 4235 N. Knox Ave. Chicago 41, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 182

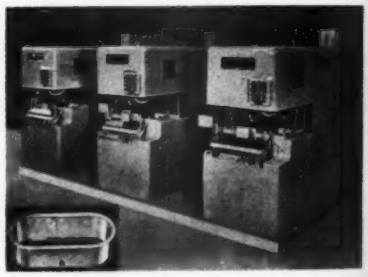
Impact Extrusion has various advantages explained in a bulletin, which also shows with detailed diagrams numerous shapes that can be formed by this process. A chart giving the nominal chemical composition of wrought aluminum alloys is included. Catalog AD551 is made available from Aluminum Company of America, Alcoa Bldg., Pittsburgh 19, Pa., or —
Circle Inform-A-Gram No. B60.

High Production Stud Setting is possible with the heavy-duty stud driving machinery featured in a new bulletin. Zinc or aluminum die castings, aluminum, steel, and cast iron can be handled by this machine. Detailed drawings are included along with a list of specifications. Write to Gray Equipment Sales Co., 13600 Ford Rd., Dearborn, Mich., for a copy of Bulletin STD-1, or —
Circle Inform-A-Gram No. B61.

AUTOMOTIVE AIR DUCTS FORMED AT HIGH SPEED AND LOW COST

A high speed automatic former to produce air inlet ducts at the rate of approximately 1500 pcs/hr has been shipped to a Ford Motor Company stamping plant by the Cyril Bath Company.

The unit has three forming heads each of which is independently powered for ready maintenance, for adjustability of output to the rate



of other operations, and for prevention of line stoppage due to difficulties with one head-unit.

There is provision for automatic stop if double or over-sized blanks should accidentally be loaded into the forming dies. The process produces air inlet ducts at high speed and at low forming cost. Pieces are produced from strip steel and without the material waste experienced in draw press practices. The machine has proven advantageous in holding flanged portions of the part accurate in dimension and flatness to simplify subsequent welding operations.

Cut Thread Gaging Costs with Taft-Peirce Rotochek®

Push! Pull! And the part is inspected! Thread gaging is as simple as that when you mechanize with the Taft-Peirce Rotochek. It's fast, accurate and easy to use . . . actually makes it possible to triple your thread inspection rate, increase sampling, or perform 100% parts inspection — without sacrificing quality or adding manpower.

Available in bench and flexible shaft models. A slight push and the gage rotates in, release pressure and Rotochek stops, pull and it disengages. Special clutch-controlled power does all the work.

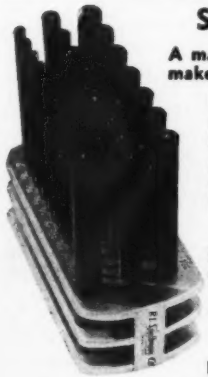
Want more information? This is your opportunity to take a real cost-saving look at your gaging operation. Send for Bulletin #612 with complete description and prices.

Mechanize your Thread Gaging with Taft-Peirce Rotochek. Takes A.G.D. standard thread plug (taper shank and reversible), and thread ring gages. Rotochek is also adaptable to many special thread gaging problems. Call on Taft-Peirce for advice.

TAKE IT TO TAFT-PEIRCE

WOONSOCKET, RHODE ISLAND

CIRCLE INFORM-A-GRAM KEY NO. 1831



SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

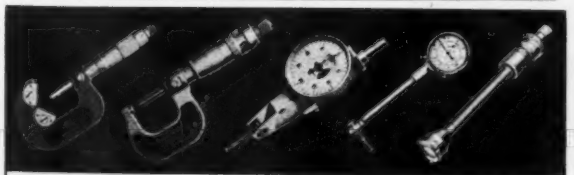
Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand—sizes 3/32" to ½" by 1/64" plus hand 17/32" size—length 4⅞". PRICE only $17.90

Single size available.

R. L. SPELLMAN CO. • Urbana, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1832



MEASURING INSTRUMENTS — INSPECTION EQUIPMENT

- Micrometers, any type
- Bore Gages, any size
- Dial & Test Indicators
- Height & Surface Gages
- Dial Vernier Calipers

ASK FOR FREE CATALOG TODAY!

- Granite Surface Plates, Angles, Parallels, Specials
- Optical Projectors, Comparators Dividing Heads, Rotary Tables
- Tool Room Machinery

ALINA — COMPAC — ETALON — GLADWIN — HELIOS — MAHR — MAUSER — PARVUS RAHN — SCHERR — TESA — TUMICO — VERDICT — ZEISS

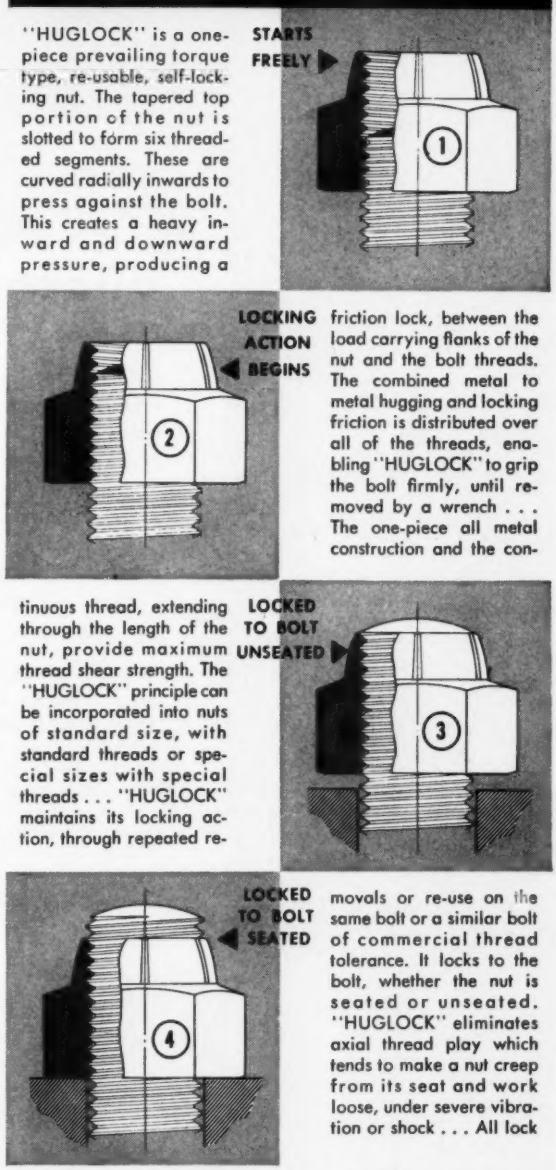
SWISS PRECISION Tool Co.

851 East 8 Mile — Detroit 20 (Ferndale), Mich. — Phone Lincoln 5-9026

CIRCLE INFORM-A-GRAM KEY NO. 1833

HUGLOCK self-locking nuts with prevailing torque . . . . . .

"HUGLOCK" is a one-piece prevailing torque type, re-usable, self-locking nut. The tapered top portion of the nut is slotted to form six threaded segments. These are curved radially inwards to press against the bolt. This creates a heavy inward and downward pressure, producing a friction lock, between the load carrying flanks of the nut and the bolt threads. The combined metal to metal hugging and locking friction is distributed over all of the threads, enabling "HUGLOCK" to grip the bolt firmly, until removed by a wrench . . . The one-piece all metal construction and the continuous thread, extending through the length of the nut, provide maximum thread shear strength. The "HUGLOCK" principle can be incorporated into nuts of standard size, with standard threads or special sizes with special threads . . . "HUGLOCK" maintains its locking action, through repeated removals or re-use on the same bolt or a similar bolt of commercial thread tolerance. It locks to the bolt, whether the nut is seated or unseated. "HUGLOCK" eliminates axial thread play which tends to make a nut creep from its seat and work loose, under severe vibration or shock . . . All lock washers, cotter pins, key plates and other locking devices can be eliminated . . . The "HUGLOCK" section of our catalog contains 24 pages. It includes complete information, specifications, engineering data, prices; will be furnished on request.



NATIONAL MACHINE PRODUCTS

Manufacturer of Standard and Special 12 Pointer and Hexagon Nuts . . . "Huglock" and "Marsden" locknuts.

44225 Utica Rd., UTICA, Michigan

an SPS COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1834

HIS JOB

....TO BUILD YOUR PROFITS!

THE *Roto-Finish* CUSTOMER'S MAN

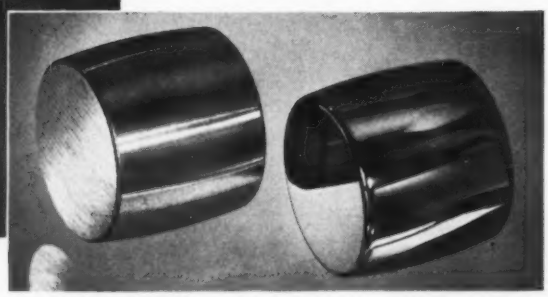
There's nothing unique about stressing product quality. But, at Roto-Finish we have an added incentive. The success of the Roto-Finish Customer's Man *depends* on providing the kind of dependable, mass-production finishing service which builds customer satisfaction, and results in a steady repeat business.

TRIAL AND ERROR FINISHING IS COSTLY

If you're now barrel finishing, our Customer's Man will welcome an opportunity to work with you in your own plant to show you how to get the finish you want, faster, and at lower cost.

If you're hand finishing, he can show you how to save up to 80% of your present finishing costs.

WANT PROOF? Then write or phone your Roto-Finish Customer's Man today.



*This photo is unretouched.

Roto-Finish Case History
MATERIAL: Bearing steel, 61 Rockwell C Scale.
OPERATION PERFORMED: Polish in Coruloy A Chips.
FINISH BEFORE: Ground to 8 RMS.
FINISH AFTER: Ground to 1¼ to 1½ RMS.

Roto-Finish COMPANY
3729 Milham Road
KALAMAZOO, MICHIGAN
Phone: Fireside 3-5578

ROTO FINISH

FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires ● AUSTRALIA—A. Flavell Ltd.—Cheltenham ● BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro ● CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto ● ENGLAND—Roto-Finish Ltd.—Hemel Hempstead ● FRANCE—Societe Roto-Finish—Paris ● GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany ● HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland ● ITALY—Societa Roto-Finish a R. L.—Milan ● SPAIN—Instituto Electroquimico, S. A.—Barcelona

CIRCLE INFORM-A-GRAM KEY NO. 184

TOOL SHOW PREVIEWS

- Equipment for automatic feeding to power presses, shears, etc. will be shown at Booth 1357 by Cooper Weymouth, Inc. A typical production line, with power press and the company's new plain stock reel, medium-duty air feed, and scrap chopper will be on display. (S109)

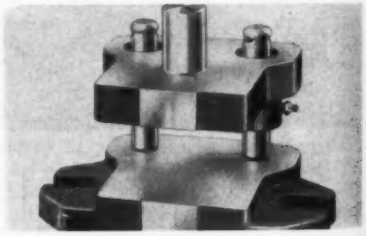
- The newly acquired line of Acra-Ment gages will be presented by Sealol Corp. at Booth 130. Of special interest will be the IE-100 gage with rotating dial indicator head, the combination ID and OD set master gage; and the SG 100 snap gage line. (S110)

- The display at Booth 331 will feature metalworking fluids — Lusol, Shamrock, Winsor K-2, and Uni-Kool. Anderson Oil and Chemical Co., Inc. will also demonstrate a new Winsor machine cleaner 607. (S111)

- At Booth 1575 a full line of standard indexing machine chassis, both turret and straight line types, will be shown by Swanson-Erie Corp. Featured will be the Series M, a standard tool mounting plate that travels up and down. (S112)

- A line of Unbrako socket head cap screws with larger head dimensions will be one of the featured items at Booth 322. Standard Pressed Steel Co. will also exhibit the new Setomatic set-screw driving machine, which can drive up to 2500 fasteners/hr. (S113)

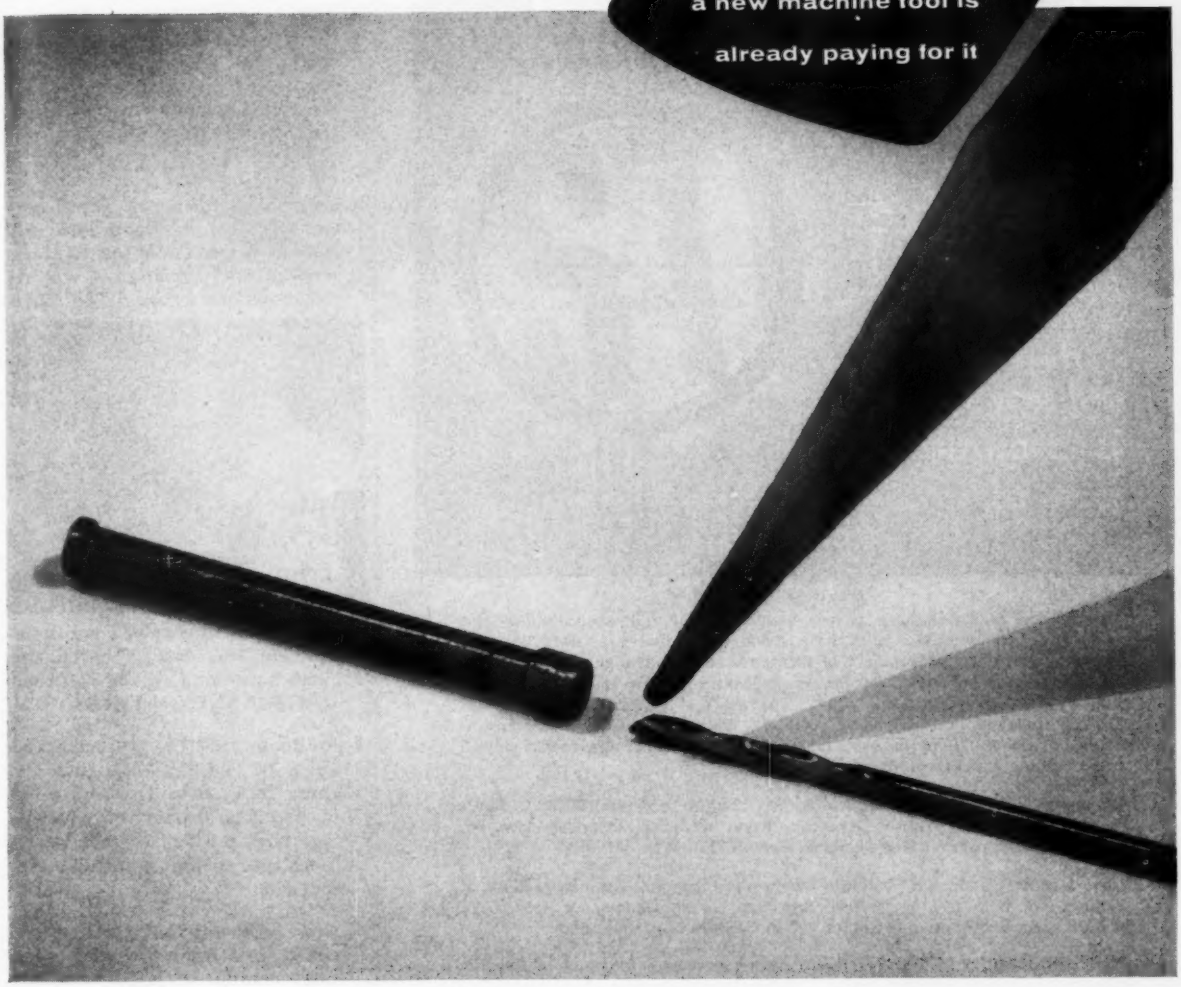
- Improved die sets (illustrated), featuring Qwik-Fit guide pins that simplify die set disassembly and reassembly, will be introduced by The Producto Machine Co. at



Booth 1500. Visitors will be able to try out these die sets and also see Sure Feed, an automatic press feeding device that can be mounted on the die set. (S114)

JONES & LAMSON OPTICAL COMPARATORS

the man who needs a new machine tool is already paying for it



How sharp is your figuring pencil?

This was a fascinating production problem! The customer for these little tubes is the world's fussiest and most exacting — Uncle Sam. And the production run was close to two million. There's a stepped hole running the length of these little pieces — that is, in the accepted ones. But the *drills* weren't fussy. Three-quarters of the time, they'd go right out through the sides of the work pieces. Needless to say, drill breakage was high.

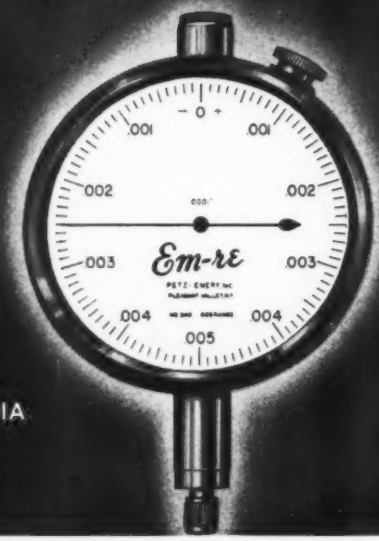
Staging the drills on a J & L Comparator revealed that some drills had curvatures. The magnified shadow of this tiny drill filled the thirty inch glass screen. The pencil is shown here, first: to dramatize the scale, and secondly; to suggest that you sharpen your pencil to find out just what inspection errors are costing you. Want to see optical comparators at work? Ask for a showing of "Beyond the Shadow of a Doubt", our 16mm, color, sound film. Jones & Lamson Machine Co., 519 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 185

Now *Em-re* Dial Indicator Accuracy

Available In A Complete Line



FIRST SHOWING
ASTE SHOW, PHILADELPHIA
BOOTH 435

"Em-re" Dial Indicators have set new standards of accuracy, repeatability and production life—standards that have made other dial indicators *obsolete*. Now the unmatched performance of these indicators is available in a *complete* line, including all four A.G.D. groups. From 96 different "Em-re" models you can choose bezel diameters of 1⅝", 2¼", 2¾" or 3⅝"; 9 ranges from .002" to .250"; graduations in .001", .0005", .00025", .0001" and .00005". In every individual model you'll find the same outstanding performance—performance well within existing A.G.D. specifications.

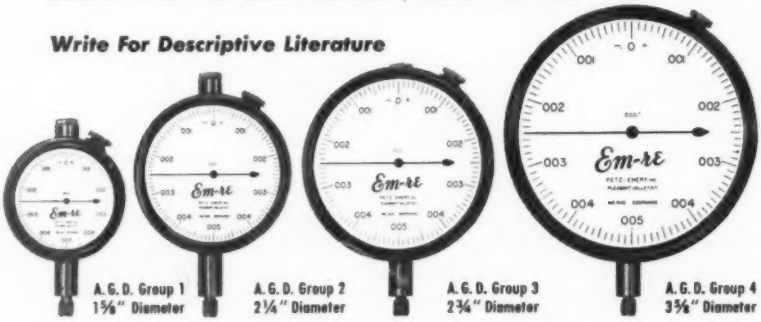
Accuracy—"Em-re" .0001" indicators are accurate to within .00002". That's 1/5 of a graduation. And the same proportion holds for all models. You can always use *all* of your allowed tolerance with an "Em-re".

Repeatability—"Em-re" accuracy has proven repeatable through millions of readings, for both fast or slow applications. No allowances are needed for inherent inaccuracies or sluggishness. All models are fully jeweled.

100% Shockproof—"Em-re" indicators are *completely* shockproof over the entire range and on the return stroke . . . with a unique shockproofing system that actually contributes to greater accuracy.

Simple Unit Construction—Of 31 total parts, 26 are common to all "Em-re" indicators. This means easier maintenance, smaller inventories.

Write For Descriptive Literature



Patented

PETZ-EMERY INC.
PLEASANT VALLEY, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 186

TOOL SHOW PREVIEWS

- Visitors at Booth 213 will see a line of Kwiklok quick-change tool holders and adapters manufactured by Falcon Tool Co. A demonstration will show precision positioning through the use of tape controlled machinery which leaves the operator free for quick tool changing. (S115)

- The demonstration of The Sentry Co. furnaces at Booth 436 will show how maximum tool hardness without scale or decarb will reduce heat treat costs. The Model

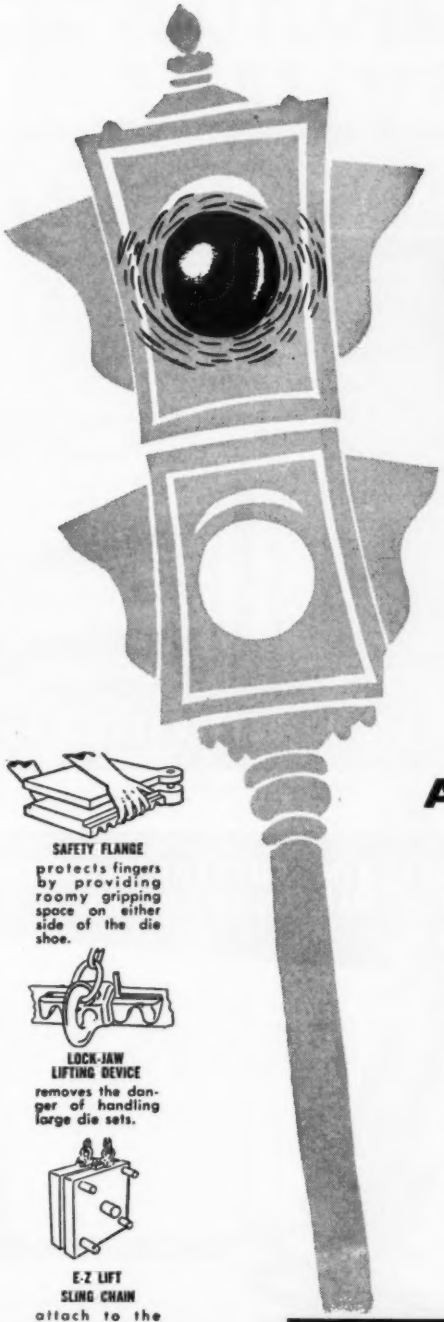
Y furnace (illustrated) will demonstrate the ease of producing clean hardening on the decarburized M-10 high speed steels. (S116)

- At Booth 1517 Davis Boring Tool Div'n of Giddings & Lewis Machine Tool Co. will exhibit a line of precision boring bars, Kwik-Size boring head, interchangeable block type tooling, and stub boring tool sets. (S117)

- New fully automatic cut-off machines, and fixtured high production contour sawing machines with high speed steel saw band, will be demonstrated in Booth 604 by The DoAll Co. A surface grinding demonstration will also be held. (S118)

- Rockwell hardness testers will be featured at the American Chain & Cable Co., Inc.'s Booth 309. A combination normal and superficial unit, the TwinTester, will be shown. The Size 3 automatic feed and discharge floor model tester will also be displayed. (S119)

- Tools and dies, the Model TML 6 x 12 surface grinder, and the Grind-All fixture will be presented at Booth 1027 by Harig Mfg. Corp. The Grind-All fixture easily grinds irregular shaped perforators concentric with shank within 0.0002". (S120)



STOP

AT BOOTH

505

A.S.T.E. EXPOSITION

where courteous experienced Superior representatives will be on hand to demonstrate the exclusive time and money saving features of Superior Die Sets.

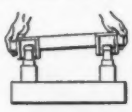
Illustrated at the left are just a few of many profit producing advantages you can enjoy in your die shop or stamping plant.

We'll be looking for you at the show!!!

SAFETY FLANGE
protects fingers by providing roomy gripping space on either side of the die shoe.

LOCK-JAW LIFTING DEVICE
removes the danger of handling large die sets.

E-Z LIFT SLING CHAIN
attach to the lock-jaw for immediate lifting.



"REMOVABLE CAP" PINS
End troublesome binding in parting dies.

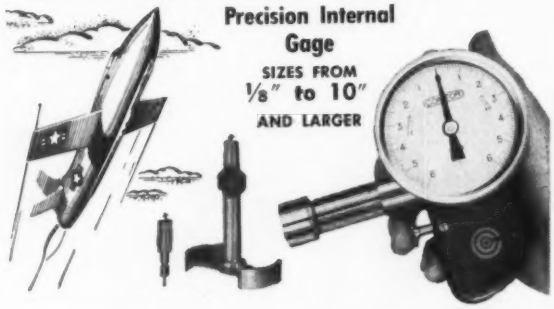
SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS.

PLANTS AT MILWAUKEE, WISCONSIN
PLAINVILLE, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 187

Did you know that---

The Jet Engine Program relies heavily upon this gage for critical bores.



Precision Internal Gage

SIZES FROM 1/8" to 10" AND LARGER

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8 to 10" dia.

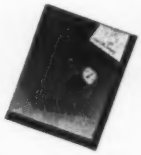
UNIQUE ADVANTAGES

- Large dial with .0001" graduations.
- Indicates actual size, a fixed — not passing — reading.
- Portable — no wire, hoses, stands or electronic gear.
- Positive 2-point gaging — automatic centering.
- Assured accuracy regardless of who operates it.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Will gage work in the machine.
- A shop tool for all-day every day use.

Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly No other like it—investigate and see why.

COMTOR COMPANY

82 Farwell St.
WALTHAM 54, MASS.



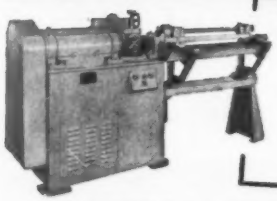
GET THE FACTS—REQUEST BULLETIN 50

CIRCLE INFORM-A-GRAM KEY NO. 1881

new

SHUSTER 2AV

infinite, variable speed, electrically controlled,
Automatic Wire Straightening and Cutting Machine!



CAPACITY: 1/16" to 5/16" mild steel wire, 1/16" to 3/16" high tensile wire, 50 to 200 FPM.

Send for complete details on this high speed, low cost dependable SHUSTER! Ask for our quotes on your wire straightening and cutting needs for any wire sizes from .020" to 1 1/16".

SHUSTERS give you straightened and cut wire *when* you need it, at lower investment than any comparable machines. The right combination to lowered production costs is *coiled* wire plus a dependable SHUSTER. Let one of our sixty representatives (there's one near you) give you the facts. Let us show you how you can materially lower your wire production costs!

See the 2AV at ASTE Show Booth No. 2142

METTLER MACHINE TOOL, Inc.

150 W. Adeline St., New Haven, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1882

GEORGE L. DETTERBECK CO.

SINCE 1911

World's Largest Exclusive Manufacturer of
SCREW MACHINE TOOLS!

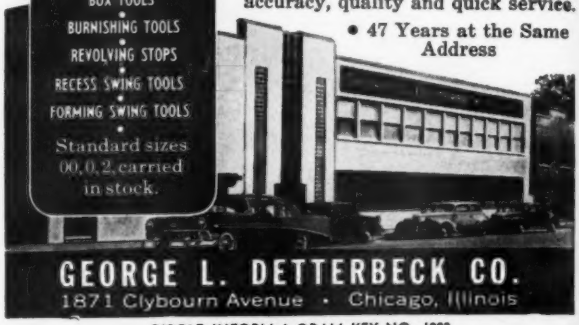
CUTTING CAMS
HIGH SPEED STEEL AND CARBIDE FORM TOOLS
SPECIAL CUTTING TOOLS
SPLIT DRILL BUSHINGS
CROSS SLIDE KNURL HOLDERS
TOOL BITS
BOX TOOLS
BURNISHING TOOLS
REVOLVING STOPS
RECESS SWING TOOLS
FORMING SWING TOOLS
Standard sizes 00, 0, 2, carried in stock.

We specialize in one thing only . . . designing and making SCREW MACHINE TOOLS!

47 years experience goes into every tool we make. They come to you ready for use . . . Precision design . . . Skilled workmanship . . . Finest materials.

Our extensive facilities save you TIME . . . MONEY . . . and give you accuracy, quality and quick service.

• 47 Years at the Same Address



GEORGE L. DETTERBECK CO.
1871 Clybourn Avenue • Chicago, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1883

BURR-BIT CUTS TAPPING COST WAY DOWN!

Just lock Burr-Bit on any make tap and holes are deburred automatically, leaving a smooth clean chamfer. ONE OPERATION, ONE SETUP, ONE HANDLING.

NEW ADDITION
Now Burr-Bit fits 3 fluted taps from #6 to 1/2". Also available to fit any tap 2 or 4 fluted from #2 to 3/4", as well as heli-coil.

A quality product made of the finest high speed tool steel for use on almost every material.

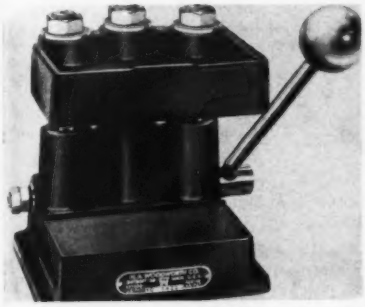
WRITE now for complete data and reports from engineers who have adapted Burr-Bit and saved on their tapping operations.
INVESTIGATE Burr-Bit-today.

VERNON DEVICES, Inc.
481 E. 3rd Street Mt. Vernon, N.Y. MOunt Vernon 4-1686

CIRCLE INFORM-A-GRAM KEY NO. 1884

TOOL SHOW PREVIEWS

- Tork-Lok collet arbors and Cone-Lok jigs (illustrated) will be presented at Booth 412 by N. A. Woodworth Co. They will highlight their standardized workholding devices and the adaptation of standards to specially designed fixtures and tools. (S121)



- A variety of new Red Ring gear tooth honing tools for performing hard gear tooth finishing operations on spur or helical external and internal gears will be on display at Booth 922. They are designed by National Broach & Machine Co. to remove nicks and burrs, improve surface finish, and make minor tooth shape corrections. (S122)

- One of the machines to be exhibited by Wickman Mfg. Co. at Booth 1405 is the GF-2 MK II universal tool grinder equipped for surface grinding, chipbreaker grinding, and universal tool grinding. Also on display will be the Index single-spindle high precision turret automatic screw machines; tapping attachments; and GF-2A bench type carbide grinders. (S123)

- Presentation of a new line of drill grinders which perform any drill grinding job in a matter of seconds will be done by Alina Corp. The Select-O-Point drill grinders, to be seen at Booth 1774 grind twist drills, step drills, spot facing cutters, keyway milling cutters, etc. (S124)

- On display at The Challenge Machinery Co. exhibit at Booth 1073 will be a new type of lightweight tooling bridge for accurate measurement of models, dies, and tools. Also to be shown will be the new lightweight magnesium tooling angle and a heavy-duty toolmaker and machinists work bench. (S125)

DALZEN

THREAD GRINDER

- AVERAGE SET-UP TIME 30 MINUTES!
- SAVES FLOOR SPACE!
- LOW COST!

Excellent for tool room and production Thread Grinding. Easily set-up from job to job! Has built-in relieving attachment as standard equipment for grinding of taps. This remarkable machine may also be used to grind angles, grooves and surfaces where concentricity is an important factor!

Dresser and wheel head are self-compensating. Size of work is automatically maintained after dressing of wheel regardless of how much is dressed off.

The grinding and regrinding of thread rolls up to 3" in diameter and thread milling cutters can also be ground with special attachment.

Photo shows just a few of the many jobs done on the DALZEN THREAD GRINDER.

2 in 1 COMBINATION
CENTER GRINDER & DRILL PRESS

A drill press and center lapping machine at less than the cost of many single purpose center grinders! In addition to savings on equipment costs, the Dalzen "2 in 1" permits maximum man-hour production thereby keeping your unit cost at a minimum!

1 SIMPLE OPERATION CHANGES CENTER GRINDER TO DRILL PRESS

Center grinder to drill press or drill press to center grinder in a matter of seconds! Simply unlock clamping handle and swing diamond dresser in or out of position! Photo at right shows center grinder at work.

A full 43" capacity from base to spindle . . . dresser adjustment from 20° to 100° included angle . . . drills to center of 15" circle . . . maximum lapping stone dia. 3".

WE ALSO SPECIALIZE IN THREAD ROLLING DIES AND THREAD HOBS LITERATURE ON REQUEST

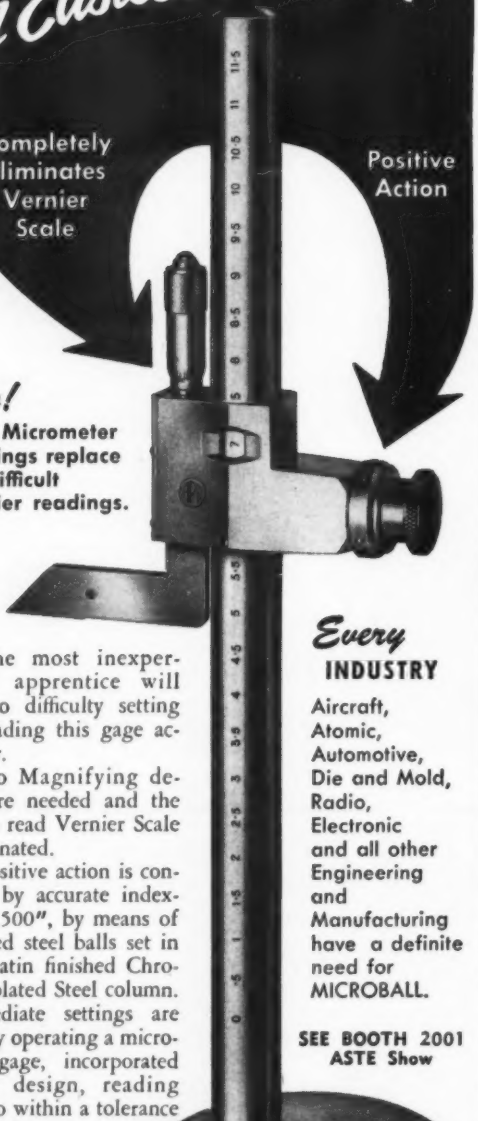
DALZEN MANUFACTURING CO.
4600 BREE ROAD DEPT. TP-4
ST. CLAIR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 189

"MICROBALL"
MICROMETER Height Gage
for Easiest Reading

Completely Eliminates Vernier Scale

Positive Action



Now!
Easy Micrometer readings replace the difficult Vernier readings.

The most inexperienced apprentice will have no difficulty setting and reading this gage accurately.

No Magnifying devices are needed and the hard to read Vernier Scale is eliminated.

Positive action is controlled by accurate indexing at .500", by means of hardened steel balls set in heavy satin finished Chromium plated Steel column. Intermediate settings are made by operating a micrometer gage, incorporated in the design, reading direct to within a tolerance of .0005".

***Every* INDUSTRY**

Aircraft, Atomic, Automotive, Die and Mold, Radio, Electronic and all other Engineering and Manufacturing have a definite need for MICROBALL.

SEE BOOTH 2001 ASTE Show

After selecting the nearest indexed position by means of the adjusting wheel at the rear of the sliding head, simply turn the micrometer thimble until the appropriate graduation gives the required setting.

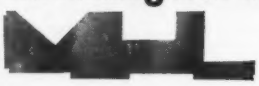
FOSTER SUPPLIES CO.

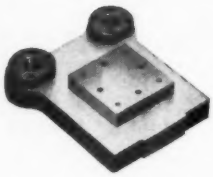
6122 Milwaukee Avenue, Dept. TP, Chicago 30, Illinois

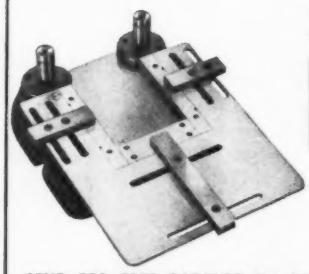
CIRCLE INFORM-A-GRAM KEY NO. 1901

Punches and Dies

Notching Die with Gauge Table







Standard stock sizes 4", 5" and 6". Lick those Notching Problems QUICKLY. Gauge table and gauging bars provide accuracy and speed with easy adjustment.

This is another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Precision made from high grade tool steel. Also adapters and die shoes to convert your press.

26 ***years of serving your punch and die requirements.***

What are your punch and die needs? Consult us about your problems. Prompt service on "Specials" made to order.

SEND FOR FREE CATALOG No. 157 AF, illustrating our standard punches and dies and complete line of modern sheet metal fabricating equipment. **Net prices shown.**

WARD Machinery Co. 564 West Washington **Chicago 6**

CIRCLE INFORM-A-GRAM KEY NO. 1902

WAIT! Save Money!
DO THAT JOB FASTER AND BETTER
WITH A Severance MIDGET MILL!
Ask for a SEVERANCE catalog today! YOU'LL FIND IT DETAILED, WELL ILLUSTRATED, SUGGESTIVE AND INFORMATIVE. IT INCLUDES LOW REGRINDING PRICES

YES, A **SEVERANCE** MIDGET MILL MAY WELL SOLVE **YOUR** PROBLEM AND SAVE YOU MONEY, IF YOU MUST REMOVE GATES, FINS, AND RISERS; BREAK SHARP CORNERS AND EDGES; MACHINE CARBON; FINISH CASTINGS OF ANY MATERIAL; WORK FILLETS, RADII, AND GROOVES; DEBURR OIL HOLES; BLEND WELDED AND ASSEMBLED PARTS; REMOVE FLASH; SMOOTH WELD BEADS; OR ANY OTHER SIMILAR OPERATIONS

MANY STANDARD SHAPES & SIZES TO CHOOSE FROM
SPECIAL SHAPES & SIZES AVAILABLE ON SHORT NOTICE
Severance MIDGET MILL SET NO. 77

SEVERANCE MIDGET MILL SET NO 77, IS A POPULAR SET OF 1/2" DIAMETER, 1/4" SHANK, HIGH SPEED MIDGET MILLS. MAKES A FINE GET-ACQUAINTED-SET AND WILL COVER A BIG MAJORITY OF YOUR NEEDS FOR THIS TYPE TOOL. LEAFLET NO.651 GIVES DETAILED INFORMATION AND PRICES. *ASK FOR IT TODAY!*

Severance TOOL INDUSTRIES INC.

730 IOWA AVE. — SAGINAW, MICHIGAN

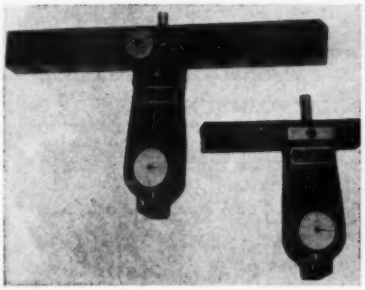
CIRCLE INFORM-A-GRAM KEY NO. 1903

TOOL SHOW PREVIEWS

- Three new series of die heads — the No. 5 stationary and revolving thread rolling heads, and the 3" and 4" type A Landmatic for straight threading — will be shown at Booth 1538 by Landis Machine Co. The new thread rolling heads are ideal for use with carbide tooling because they will produce threads at high speeds without impairing tool life. (S126)

- To be featured in the Buckeye Tools Corp. Booth 705 are a self drill, three abrasive tools, and a one-shot clutch. The self-feeding drill, capable of drilling, tapping, reaming, counterboring, and counter-sinking, has a capacity of 3/16" and a stroke length of 2". (S127)

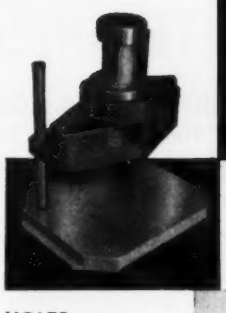
- Introduction of a line of both indicator and flush-pin type gage components for use in special gage design will be done by A. G. Davis Gage & Engineering Co. Also to



be seen at Booth 1805 will be flush-pin gage blanks and an internal groove diameter gage for production gaging (illustrated). (S128)

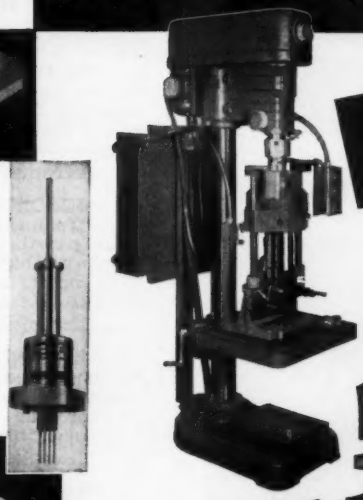
- A new cylindrical grinding machine will be demonstrated for the first time at Booth 1811 by Production Machine Co. This machine uses abrasive belts as cutting medium. The company will also demonstrate centerless grinding and finishing with machines arranged in tandem. (S129)

- To be shown at Booth 1220 by United Tool Co. is an automatic tool grinder that exactly duplicates a given form on a single point brazed or solid carbide cutting tool. The Contour-O-Matic roughs and finish grinds with the same grinding wheel in one automatic cycle, requiring an attendant only to load and unload the tools after grinding. (S130)



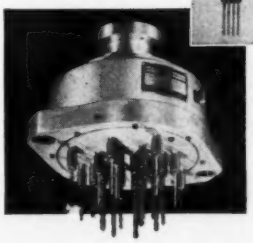
MANY Drilling and Tapping Heads ARE BETTER THAN ONE!

...let ZAGAR solve your problems

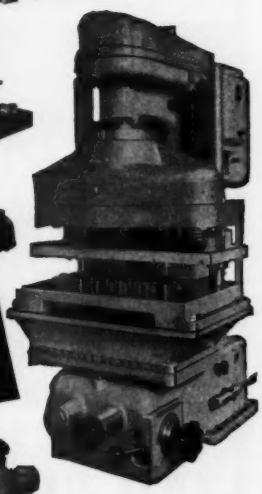


On your equipment

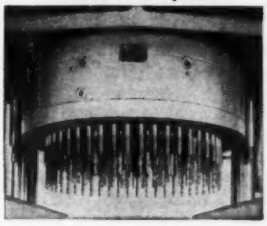
HOLES—any number, any pattern, any material, on ALL CENTERS can be drilled, reamed, or tapped with a Zagar head. Several shapes to fit your job.



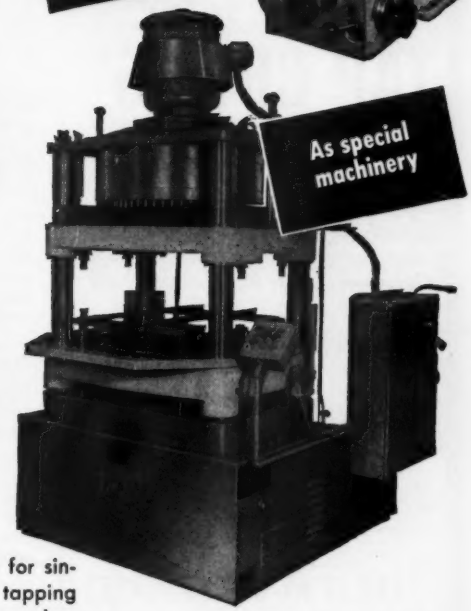
As a completely tooled package



Up to 1200 holes can be drilled at one pass.



As special machinery



Simultaneous spindle rotation for single-pass drilling, reaming, or tapping assures highest piece per hour production. The Zagar method is also profitable on intermittent, low production runs. Centers as close as sum of hole diameters is standard practice. Capacity up to 1½" hole diameter. Your print will bring a prompt quotation.

Ask for Data Sheet "T-4" containing detailed engineering information.

Zagar

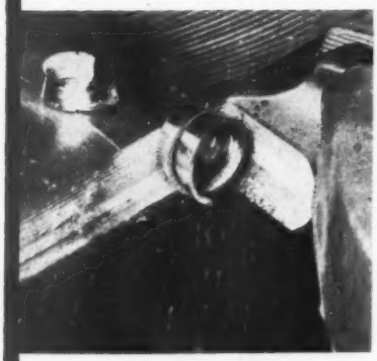
ZAGAR, INCORPORATED
23894 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 191

LONGER TOOL LIFE

FASTER CUTTING



LET YOUR CHIP TELL THE STORY

TAP CUT-25*

Modern Heat-Limiting

CUTTING FLUID

TAPPING | SHAPING | MILLING | PLANING

Your tool stays cooler . . . cuts longer . . . because Tap Cut-25 works two ways in the rupture area.

1. extreme lubricity aids in chip formation.
2. chemically active . . . it reduces rupture energy necessary for cooler cutting.

***TRY IT AT OUR EXPENSE!**

Try "Super Tap-90" on your tough-tapping 200,000 to 300,000 tensile steels for jet and missile components.

UNITED LABORATORIES
INCORPORATED
P. O. Box 918, Huntington, Indiana

See us at Booth 1220 — ASTE Show.

TECHNICAL BOOKS

HUEBNER PUBLICATIONS, INC.
1975 LEE ROAD. CLEVELAND 18, OHIO

Gentlemen: Please send me the publications I have checked.

☐ **DIE DESIGNING AND ESTIMATING**
Fourth edition. 368 pages, 26 chapters, and over 400 illustrations, drawings, charts and graphs. Extensively revised and enlarged plus a special section of 165 Practical Points in Die Design and Construction. Completely indexed.
_____copies @ $7.50 per copy. Total $_____

☐ **MICROSTRUCTURES OF DIAMOND SURFACES**
By S. Tolansky. 11 chapters of original research in the field of diamond growth. New optical techniques explained and illustrated which enable height or depth features as small as one twenty-five millionth of an inch to be resolved and magnifications in depth of half a million times to be made. 143 special art plates.
_____copies @ $8.50 per copy. Total $_____

☐ **DIAMOND TOOLS**
By Paul Grodzinski. A 379-page handbook on the industrial use of diamonds. Case histories and illustrations describe those applications in which the diamond has proved the most satisfactory tool in performance, precision and economy.
_____copies @ $4.50 per copy. Total $_____

☐ **DIAMOND TECHNOLOGY**
By Paul Grodzinski. The only standard work on the subject and the only book of its kind in technical literature. 784 pages, 93 working tables, and over 486 photographs and drawings.
_____ copies @ $10.00 per copy. Total $_____

☐ **GEARS for Small Mechanisms**
By W. O. Davis. 20 chapters, profusely illustrated covering everything from The Theory and Practice of the Design of Very Small Gears to The Design of Tools for Cutting and Generating Gear Tooth Forms.
_____copies @ $5.00 per copy. Total $_____

☐ **TREATISE ON MILLING AND MILLING MACHINES**
By The Cincinnati Milling Machine Co. Gives you the answer to practically every metalworking problem in the field of milling from the toolroom to fixture design and high production milling. 896 pages, over 200 formulas and 700 illustrations and charts.
_____copies @ $8.00 per copy. Total $_____

☐ **THE PRINCIPLES OF INVENTORY MANAGEMENT that Lead to Higher Profits**
By Nyles V. Reinfeld. An authoritative 32-page treatise on the economic aspects of analysis within your existent inventory control system. Includes order quantity analysis, re-order point analysis, marginal analysis and safety allowances in continuous production.
_____copies @ $2.00 per copy. Total $_____

☐ **COLD FORMING OF THE STAINLESS STEELS**
By Lester F. Spencer. 28 pages of KNOW-HOW on the blanking, punching, perforating, and bending, forming, deep drawing and spinning of the stainless steels.
_____copies @ $1.00 per copy. Total $_____

☐ **MACHINING, HEAT TREATMENT & PICKLING OF THE STAINLESS STEELS**
By Lester F. Spencer. 36 pages on the working of stainless — including drilling, tapping, threading, reaming, skiving, milling, broaching and shaving, plus heating and quenching procedures.
_____copies @ $1.50 per copy. Total $_____

TOTAL AMT. OF ORDER | $ |

Check, money order or cash with order, please. Open account shipments on company purchase orders when total amount exceeds $3.00. No. C.O.D.'s please. Ohio customers add 3% sales tax. Quantity Prices quoted on request.

COMPANY_____

BY_____TITLE_____

ADDRESS_____

CITY_____ZONE_____STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 1921

BEST IN QUALITY...BEST IN DESIGN!

Marcellus PRECISION BUILT TOOLING

ADAPTER BUSHINGS
Finest bushings available anywhere! Spring-type for fast set-ups. Prompt delivery from stock. *Quality guaranteed!*

RELEASING-TYPE TAP HOLDERS

BAR MACHINE TAP HOLDERS

SELF-ALIGNING REAMER HOLDERS

TURRET CHANGE ROLLS AND STUDS

ORIGINAL NON-RELEASING TAP HOLDER WITH HOLE THRU SHANK

REVOLVING STOPS

RECESSING TOOLS

CAM AND BOX MILL ROLLS AND PINS

GAGES
ADAPTERS

NEW CATALOG... *FREE*

Get your copy NOW. Complete sizes and specifications for easier tool planning. WRITE TODAY. *Open territories available.*

Marcellus Mfg. Co. BELVIDERE ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1931

Extra Capacity with

hall COLLET CHUCKS

for SPEED, ACCURACY, ECONOMY

Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size. Without adjustments. Shortest overhang. All grip ...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Three Sizes to Fit Your Requirements:

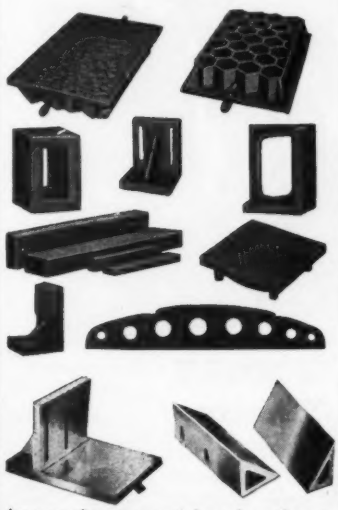
Model A...1" (max. capacity 1-1/16")
Model B...2" (max. capacity 2-1/16")
Model C...3" (max. capacity 3¼")

Write today for illustrated catalog and price list

HALL MANUFACTURING COMPANY
622 NORTH TULAROSA DRIVE, LOS ANGELES 26, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 1932

ACCURATE INSPECTION TOOLS



Accuracy of measurement depends on the precision of the measuring tools. Provide your Shop and Inspection Department with dependable and proper inspection tools. MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.

Surface Plates—Box Parallels—Slotted Angle Plates—Universal Right Angles—Flat Parallels—Lapping Plates—Toolmaker's Knees—"V" Blocks—Straight Edges (Bridge Type)—Straight Edges (Leveling Type)—Measuring Irons—Masterangle Plates—Angle Attachments

SURFACE PLATES RESCRAPED

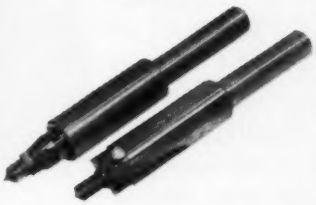
ACME TOOL CO.
75 W. Broadway, New York 7, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1933

STANDARD

PORT CONTOUR CUTTERS

Stocked for Immediate Shipment



Combines 5 Operations in One
All Tolerances
Well Within
AND 10050—MS-33514—
MS-35515

A complete line of combination ream, counterbore and facing tools to form AND-10050 standards. Tube size 2 thru 32 carried in stock. Also tools for MS-33514 and MS-35515 Tolerances carried in stock sizes 2 thru 20. Special tools made to order.

WETMORE TOOL & ENGINEERING CO.
5320 E. Washington Blvd.,
Los Angeles 22, Calif.
AN 9-7266

CIRCLE INFORM-A-GRAM KEY NO. 1934

Small Parts ?

DIE CAST THEM IN YOUR OWN PLANT WITH MINIMUM INVESTMENT ON

DCMT DIE CASTING MACHINES

Up to 1000 pieces per hour! Write for FREE BOOKLET explaining entire process.

DCMT SALES CORP.
Dept. DD 1108
Div. British Industries Corp.
Port Washington, New York

CIRCLE INFORM-A-GRAM KEY NO. 1935

Lipe automatic magazine loading bar feeds are now available for all Screwmatic 750 machines. They will be installed, serviced, and maintained by Gear Grinding Machine Co., according to terms of a recent agreement with Lipe-Rollway Corp. The pneumatically controlled unit holds an 8-hr supply of bars, rods, or tubing.

CUMULATIVE EDITORIAL INDEX FOR 1958 ISSUES

TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this new, unique and useful index.

The Publisher

Abrasives, coated, performance factors of, Jan. p. 87 (4 pp)

Alloys, high temperature, formed by high-impact-spin technique, Jan. p. 78 (4 pp)

Bearings
- Bushings, pilot, live roller, Mar. p. 65 (3 pp)
- Inventory, reduction of, Mar. p. 73 (1½ pp)
- Life, improvement of, Mar. p. 74 (¾ p)

Boring, jig, horizontal, Mar. p. 57 (4 pp)

Brazing, honeycomb fabrication by, Jan. p. 73 (4½ pp)

Bushings, pilot, live roller, Mar. p. 65 (3 pp)

Carbide
- Milling steel on low-horsepower machines, Feb. p. 83 (5 pp)
- Pilot bushings for improved life, Mar. p. 65 (3 pp)
- Throwaway insert standards, Feb. p. 79 (2½ pp)
- Tools, diamond grinding wheels for, Feb. p. 67 (12 pp)
- Tools, new cutting materials for, Feb. p. 88 (5 pp)
- Tooling, throwaway insert control, Feb. p. 79 (2½ pp)

Coated abrasives, performance factors of, Jan. p. 87 (4 pp)

Cold forming high temperature alloys, Jan. p. 78 (4 pp)

Contour, projectors for production and inspection, Mar. p. 75 (2 pp)

Contouring, numerical control, vs. tracer control, Jan. p. 72 (½ p)

Control, tracer, vs numerical control, Jan. p. 72 (½ p)

Coolants for diamond wheels, Feb. p. 67 (12 pp)

Cutting tools
- Carbide insert milling cutters for low-horsepower machines, Feb. p. 83 (5 pp)
- Gun drill applications, Jan. p. 67 (5¼ pp)
- Materials, metallurgy of, Feb. p. 88 (5 pp)

Diamonds, special report, use and conservation of, Feb. p. 67 (12 pp); correction of, Mar. p. 69 (1 p)

Drilling, gun application of, Jan. p. 67 (5¼ pp)

Electronic machine, future application of, Mar. p. 51 (1 p)

Feeds and speeds for diamond wheels, Feb. p. 67 (12 pp)

Gages, gun drill, construction of, Jan. p. 67 (5¼ pp)

Grinding and finishing
- Angular grinding on surface grinders, Feb. p. 82 (1 p)
- Diamond wheels for, Feb. p. 67 (12 pp)
- Finish, checking smoothness of, Mar. p. 56 (1 p)
- Gun drill cutting edges, Jan. p. 67 (5¼ pp)

Gun drilling, application of, Jan. p. 67 (5¼ pp)

Hole punching by grid layout, Jan. p. 110 (½ p)

Honeycomb sandwich structures, fabrication of, Jan. p. 73 (4½ pp)

Inspection
- Contour projection for, Mar. p. 73 (1½ pp)
- Finish, checking smoothness of, Mar. p. 56 (1 p)

Inventory, bearings, reduction of, Mar. p. 73 (1½ pp)

Jig boring, horizontal, Mar. p. 57 (4 pp)

Lathe, high precision headstock for, Jan. p. 82 (2 pp)

Machine tools, replacement of, Feb. p. 65 (1 p)

Machining (also see specific process)
- Horizontal jig boring, Mar. p. 57 (4 pp)

Management, responsibilities delegated by, Mar. p. 53 (2½ pp)

Materials, cutting tools, metallurgy of, Feb. p. 88 (5 pp)

Milling cutters, carbide inserts for low-horsepower machines, Feb. p. 83 (5 pp)

Milling
- Cutters, carbide inserts for low-horsepower machines, Feb. p. 83 (5 pp)
- Machines, live bearings for, Mar. p. 65 (3 pp)

Numerical control, application of, Mar. p. 84 (1 p)

Plastic tooling, increased use of, Mar. p. 70 (1½ pp)

Presses, automatic, for high production, Mar. p. 68 (1 p)

Research, industrial, evaluation of, Jan. p. 8 (3 pp)

Salvage, diamonds, program for, Feb. p. 67 (12 pp)

Small business, technical assistance for, Jan. p. 8 (3 pp)

Spindles, precision, analysis of, Jan. p. 84 (2½ pp)

Standard units form special stud driving machines, Mar. p. 78 (2 pp)

Standards for carbide throwaway insert tools, Feb. p. 79 (2½ pp)

Steel, stainless, failure of, Mar. p. 55 (½ p)

Stud driving machines, special, from standard units, Mar. p. 78 (2 pp)

Technology of this age, Feb. p. 22 (2½ pp)

Titanium, hot forming of, Jan. p. 172 (¾ p)

Tools, jig boring, setup for, Mar. p. 57 (4 pp)

Training for plastic tooling, Mar. p. 70 (1½ pp)

Welding
- Arc, automatic machines for, Mar. p. 61 (3½ pp)
- CO_2, for die set construction, Mar. p. 71 (1½ pp)
- Spot and seam, for honeycomb fabrication, Jan. p. 73 (4½ pp)

Wheel trueing tools, diamond, special report on, Feb. p. 67 (12 pp); correction of, Mar. p. 69 (1 p)

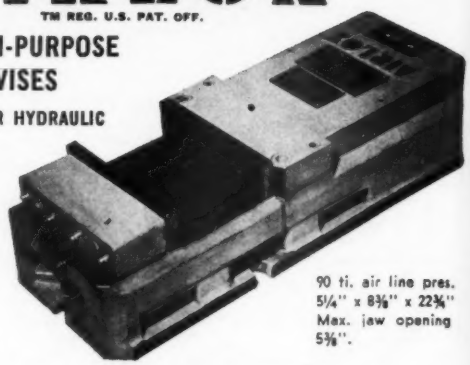
FOR PRECISION PRODUCTION

AIRLOX

TM REG. U.S. PAT. OFF.

MULTI-PURPOSE VISES

AIR OR HYDRAULIC



Type S-7 Illustrated

90 ti. air line pres. 5¼" x 8⅜" x 22¾" Max. jaw opening 5⅜".

ADAPTABLE AS POWER JIG OR FIXTURE OR SHORT STROKE BENCH PRESS

AIRLOX vises are precision built tools powered by specially engineered air or hydraulic cylinders. They can be operated manually or synchronized with the movement of a milling machine table or drill press spindle. They can be furnished in sets if desired so that the same tolerance is held between the base cross keyway and fixed jaw casting face on each vise.

AIRLOX patented wedge-&-lever action utilizes total cylinder drive, providing positive rigid grip on the work, exceptionally suited to carbide milling and almost all other milling operations.

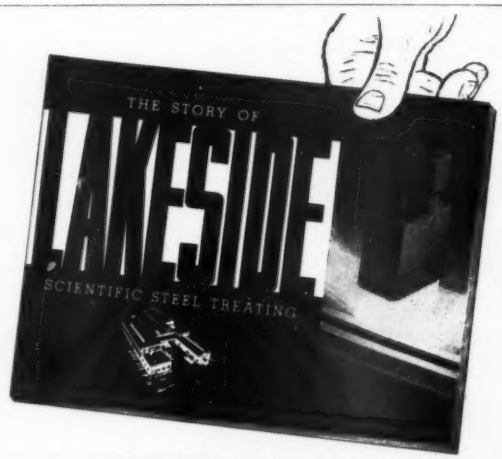
Write for descriptive literature

ASTE Booth No. 1363

production devices incorporated

Whitehall, N. Y. - - phone 40

CIRCLE INFORM-A-GRAM KEY NO. 1941



Want to KNOW MORE about Steel Treating

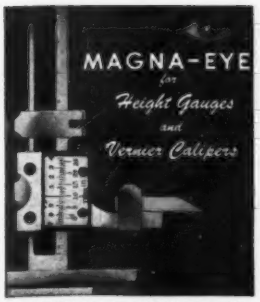
Here's the complete Lakeside story — all in one easy-to-read brochure! Big pictures showing how we perform every scientific steel treating service. Short but explicit descriptions of our many services and how you can best use them. It's the "most read" story of steel treating in industry today — Be sure you get your copy — Write or call NOW!

Our Services:
Flame Hardening*, Bar Stock Treating and Straightening (mill lengths and sizes), Carbonitriding, Heat Treating, Annealing, Electronic Induction Hardening, Stress Relieving, Normalizing, Carburizing — Pack, Gas or Liquid, Nitriding*, Speed Nitriding, Aerocasing, Chapmanizing*, Cyaniding — Gas or Liquid, Sand Blasting, Liquid Honing, Magnaflux Inspection, Laboratory Physical Testing.
*LICENSED PROCESS

THE Lakeside Steel Improvement Co.

5418 LAKESIDE AVE., CLEVELAND 14, OHIO HENDERSON 1-9100

CIRCLE INFORM-A-GRAM KEY NO. 1942



MAGNIFIES "HARD-TO-READ" VERNIER SCALES ON HEIGHT GAGES AND CALIPERS

MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. **LENS** is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. 6 No. 100 for 6" Vernier Calipers; 6 No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; 6 No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" 60" and 72" Calipers.
For Complete Information Write, Phone or Wire

STEBAR COMPANY
215-221 28th Ave. North Minneapolis 11, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1951

Star Stainless screws have clean—bright and—shiny—heads

STAR STAINLESS SCREW CO.

CORROSION RESISTANT

679 Union Blvd., Paterson 2, N. J.
Telephone: CLifford 6-2300
Direct N. Y. Phone: WI 7-9041
Direct Phila. Phone: WA 5-3660

CIRCLE INFORM-A-GRAM KEY NO. 1952

DIE DESIGNING AND ESTIMATING

Fourth Edition

368 pages, 26 chapters, over 400 illustrations, charts, and graphs. 165 Practical Points in Die Design and Construction. Comprehensively indexed.

Written expressly for Die Designers, Die Engineers, Tool and Die Makers, Owners and Managers of Tool and Die Shops and Depts., Students, Apprentices and valuable, too, as a reference and refresher for the die experts who are more than qualified to write a comparable text.

$7.50* per copy

Huebner Publications, Inc., P.O. BOX 3505, 1975 LEE RD., CLEVE. 18, O.
Gentlemen:
Please ship immediately_____copy (copies) of DIE DESIGNING AND ESTIMATING, Fourth Edition, at $7.50* per copy.
Open account shipments on purchase orders of rated companies.
Otherwise, check must accompany order. No C.O.D.'s, please.
*Ohio customers add 3% sales tax.

COMPANY_____
BY_____ TITLE_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

PRECISION BORING

WITH

MAXWELL MASTUR TOOLS

• Adjustable to 0.0002-inch, the new improved MASTUR boring tools feature precision, speed and long service life. New body and block construction permits these tools to take heavier cuts at higher speeds—to do more work in less time.

Adjusting-screw head is graduated into 50 divisions to provide readings in thousandths, and body is graduated to permit vernier readings of 0.0002-inch. The three models available have maximum boring bar capacities of 1/2, 3/4 and 1-inch and boring range from 3/8 to 15 inches.

Write for catalog.

1012-MC

THE MAXWELL COMPANY

450 East 5th St.
ASHTABULA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1953

ADVERTISERS' INDEX

A. I. T. Diamond Tool Company 136
Ace Drill Corporation 177
Acme-Danneman Co., Inc., Danneman Die-Set Division 57
Acme Industrial Co. 52
Acme Tool Corp. 193
Advance Products Corp. 56
Aget Manufacturing Co. 144
Alina Corporation 157
Allegheny Ludlum Steel Corp. 167
Aloris Tool Co., Inc. 176
Alsop Engineering Corp. 10
American Brass Co. 67
American Drill Bushing Co. 19
Armstrong-Blum Mfg. Co. 152
Armstrong Bros. Tool Co. 164
Arrow Tool & Reamer Company 168

Balas Collet Mfg. Co. 3
Barber-Colman Co., Hendey Machine Div. 14
Bausch & Lomb Optical Co. 12, 64
Bay State Abrasive Products Co. 24
Bearings, Incorporated 60
Bellows Company 16
Edward Blake Co. 153
Blanchard Machine Co. 7
E. W. Bliss Co. 115
Boyar-Schultz Corp. 123
Branch Manufacturing Company 144
Brown & Sharpe Mfg. Co. 131
Buck Tool Company 156
Buckeye Tools Corp. 8
Burgmaster Corp. 118
J. C. Busch Company 198
H. L. Bushman Co., Inc. 154

Capewell Mfg. Co. 130
Central Safety Equipment Co. 163
Challenge Machinery Company 127
Chicago Tool & Engrg. Company 180
Cincinnati Milling Machine Co., The 103
Robert H. Clark Company 148
Clearing Machine Corp., Div. of U. S. Industries, Inc. 124, 125
Columbus Auto Parts Co. 31
Comtor Company 188
Continental Tool Works, Div. Ex-Cell-O Corp. 159
Lawrence H. Cook, Inc. 161
Cullen Mfg. Co. 157
Cushman Chuck Co. 51

DCMT Sales Corp. 193
Dalzen Manufacturing Company 189
Danneman Die Set Div., Acme-Danneman Co., Inc. 57
Dayton Rogers Mfg. Co. 158
J. Arthur Deakin & Son 161
Defiance Machine & Tool Co. 141
Detroit Die Set Corp. 110
Detroit Reamer & Tool Co. 54
Detroit Stamping Co. 164
George L. Detterbeck Company 188
DeVlieg Microbore Div. DeVlieg Machine Co. 117
Dixon Automatic Tool, Inc. 138
H. E. Dickerman Mfg. Co. 145
The DoAll Company 58
Donley Products, Inc. 180
Ernest F. Donley's Sons, Inc. 147
Dow Chemical Co. 11
Drillmation Company 168
Dumore Company 47
Durant Tool Supply Co. 165
The Dykem Company 134

East Shore Machine Products Co. 157
Eastern Machine Screw Corp. 157
Eclipse Counterbore Co. 155
Economy Tool & Machine Co. 138
Ehrhardt Tool & Machine Co. 108
Eisler Engineering Co., Inc. 198
Emhart Mfg. Co., V & O Press Co. Div. ...116
Engelhard Industries, Inc. 165
Engis Equipment Co. 135
Erickson Tool Co. 68
Ex-Cell-O Corp., Continental Tool Works Div. 159

Federal Machine Tool Co. 130
Federal Products Corp. 107
Feedall, Incorporated 148
Fellows Gear Shaper Co. 32
Field Tool Supply Co. 63
Firth Sterling, Inc. 122
Flotrusion, Div. Darco Industries 134
M. A. Ford Mfg. Co., Inc. 179
Foster Supplies Company 190

Gaertner Scientific Corp. 198
Gage Company 163
Gardner-Denver Co., Keller Tool Div. 50
Gas Appliance Service, Inc. 198
Gatco Rotary Bushings Co. 164
Gisholt Machine Co. 49
George Gorton Machine Co. 36
Graphic Systems 165
Gray Equipment Company 181
The Greist Mfg. Co. 178
Gries Reproducer Corp. 197
Grip Nut Company 151

ADVERTISING REPRESENTATIVES

CHICAGO 1: Robert R. Pierson, 333 N. Michigan Ave., FRanklin 2-4811

CLEVELAND 18: Jerry J. Miller, 1975 Lee Rd., FAirmount 1-4040

DETROIT 2: R. F. Pickrell, Larry Pickrell, 318 Stephenson Bldg., TRinity 1-0790

NEW YORK: Philip N. Meade, 60 E. 42nd Street, Room 411, New York 17, N. Y., YUkon 6-7695

NEW ENGLAND: R. N. Jorgenson, P. O. Box 55, Granby, Conn. OLdfield 3-6759, OLdfield 3-6850

LOS ANGELES 32: M. D. Pugh, Donn Pugh, P. O. Box 32188, CApitol 2-8857

Hall Mfg. Co. 193
Hamilton Tool Company 27, 137, 139
Hardinge Brothers, Inc. 200
Hartford Special Machinery Co. 17
Heimann Mfg. Company 161
Hendey Machine Div., Barber-Colman Co. 14
Hevi Duty Electric Co. 140
Hill Acme Company 172
Horspool & Romine Mfg. Co. 154
Hovis Screwlock Co. 160
Huebner Publications, Inc. 192, 195
K. H. Huppert Co. 176
Wm. T. Hutchinson Co. 121
Hydraulic Press Mfg. Co. 59

Industrial Filtration Co. 162
Industrial Tectonics, Inc 176

Jacobs Manufacturing Co. 40
Jergens Tool Specialty Co. 172
Johnson & Bassett, Inc. 130
Johnson Gas Appliance Co. 147
Johnson Mfg. Corp. 173
Jones & Lamson Machine Co. 133, 185

Keller Tool Div., Gardner-Denver Co. 50
Kidde Precision Tool Corp. 147, 154

L W Chuck Co. 176
The Lakeside Steel Improvement Co. 194
Lamina Dies & Tools, Inc. 70
Lapeer Mfg. Co. 180
Lavallee and Ide, Inc. 4
Louis Levin & Son, Inc. 136
Littell Machine Co., F. J. 119
Logan Engineering Company 109
Logansport Machine Co., Inc. 114
Lovejoy Tool Company, Inc. 34

Marcellus Mfg. Co. 193
Master Chemical Corp. 62
Maxwell Industries 195
Mayline Company 158
Mead Specialties Company 180
Medelton Co., Inc. 153
Meehanite Metal Corp. 105
Metal Carbides Corp. 30
Mettler Machine Tool, Inc. 188
W. F. Meyers Co., Inc. 144
Michigan Chrome & Chemical Co. 197
A. Milne & Co. 138
Mohawk Tools, Inc. 42
Moline Tool Company 22
Monroe Engineering Products 136
Moore Special Tool Co., Inc. 113, 153

The National Acme Co. 106, 129
National Broach & Machine Co. 39
National Machine Products Co. 183
National Tool Salvage Co. 158
Niagara Machine & Tool Works 28
Nichols-Morris Corporation 165
Nicholson File Co. 53
Northwestern Tools, Inc. 175
The Norton Company 142

Ohio Knife Company 136
O'Neil-Irwin Mfg. Co. 18
Onsrud Machine Works, Inc. 174
Opto-Metric Tools, Inc. 151
Ortman-Miller Machine Co. 197

Parker-Kalon Div., General American Transportation Corp. . 61
Parker-Majestic, Inc. 65
Perkins Machine Company 169
Petz-Emery, Inc. 186
Portage Double-Quick Tool Co. 134
Porter Precision Products 112
Pratt & Whitney Company 45
H. P. Preis Engraving Machine 154
Production Devices, Inc. 196
Producto Machine Company 55
Punch Products Corp. 126
Putnam Tool Company 150

Raymond Mfg. Co. 148
Reid Tool Supply Co. 179
Rice Pump & Machine Co. 138
J. A. Richards Company 168
Ring Punch and Die Company 154
Roto-Finish Co. 184

George Scherr Co. 134, 175
Schrillo Engineering Co. 6
Scully-Jones & Co. 171
Sealube Co. 146
Seneca Falls Machine Co. 148
Service Machine Company 179
Severance Tool Industries 190
Sheldon Machine Co. 182
Shore Instrument & Mfg. Co. 198
Silber Products, Inc. 161
Skinner Chuck Co. 23
Snyder Tool & Engrg. Co. 2
R. L. Spellman Co. 183
Sperry Products, Inc. 141
Spiral Step Tool Co. 144
Standard Parts Co. 166
Star Jack Co. 161
Star Stainless Screw Co. 195
Stebar Co. 195
Sunnen Products Co. 13
Superior Hone Corp. 141
Superior Steel Products Corp. 187
Swiss Precision Tool Co. 183
Syntron Company 120

Taft-Peirce Mfg. Co. 183
The Tannewitz Works 175
C. B. Teeter 179
Threadwell Tap & Die Co. 46
Timken Roller Bearing Co. 35
Tomco Products Co. 157
Tomkins-Johnson Co. 149
Trico Fuse Mfg. Co. 153
True-Trace Sales Corp. 111

United Laboratories, Inc. 192
United States Diamond Wheel Co. 161
U. S. Industries, Inc., Clearing Machine Corp., Div. 124, 125
Universal Engineering Co. 21

Vascoloy-Ramet Corp. 5
Veet Industries 161
Vernon Devices, Inc. 188
Verson Allsteel Press Co. 199
Vinco Corp. 163
Vulcan Tool Co. 151

Ward Machinery Co. 190
Wardwell Mfg. Co. 171
Waters Mfg. Co. 48
Watts Brothers Tool Co. 154
Wesson Co. 37
Wetmore Tool & Engrg. Co. 193
Wheel Trueing Tool Co. 43
Wheelock, Lovejoy & Co. 26
S. B. Whistler & Sons, Inc. 172
Whitman & Barnes, Inc. 9
Wisconsin Drill Head Co. 170
Wittek Mfg. Co. 171

Yoder Company 20

Zagar Tool, Inc. 191

Now Available...
FOR YOUR CONVENIENCE

Micro *Supreme Spray*

LAY-OUT DYE
(Purple)

A new, easy-to-use, dependable, spray Lay-Out Dye for tool, die, pattern, or template layout on metal. Dries instantly—shows up in sharp relief.

Also Still Available...

Micro *Supreme*

LAY-OUT AND IDENTIFICATION DYE (7 Colors)

For layout on metal and quick identification of bar stock, sheets, strips, or parts. Also dries instantly and shows up in sharp relief. Available in brush-in-cap cans and larger containers.

Write for circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY
8615 Grinnell Ave. • Detroit 13, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1971

GRC
DIE CAST & MOLDED NYLON
Fasteners
AT LOWER COST

Widest range of sizes and types . . . new kinds of fasteners never before available from stock . . . automatically produced to assure uniformity, quality and economy.

Die Cast Zinc Alloy Wing, Cap & Thumb Nuts; Wing & Thumb Screws. Molded Nylon Screws, Washers & Screw Insulators.

Write NOW for Catalog.

GRIES

GRIES REPRODUCER CORP.
World's Foremost Producer of Small Die Castings
44 Second Street, New Rochelle, N. Y.
NEw Rochelle 3-8600

CIRCLE INFORM-A-GRAM KEY NO. 1972

Series 101A
150 psi Air
1500 psi Hydraulic
Meet JIC Standards
Fit where others won't!

O-M Cylinders give power new dimensions in close quarters

Compared with cylinders of conventional design, having the same size bore, and activated by the same operating pressure, O-M's original Internal Key-type Cylinders develop more power in ⅓ less space on both air and hydraulic circuits.

These compact, powerful components, that fit where others won't, are ruggedly constructed to stand up under protracted service within a wide range of operating pressures. The O-M Internal Locking Key simplifies disassembly, inspection, and service with no alignment problems in reassembly. Besides, the ports can be oriented to any position.

The unique O-M design also assures maximum versatility. By using a majority of standard parts, you get the advantage of "special" cylinders designed to do your job better at a very nominal cost over standard cylinders. These and other engineering advantages and economies of O-M Internal Key-type Cylinders suggest uses in a wide variety of original equipment.

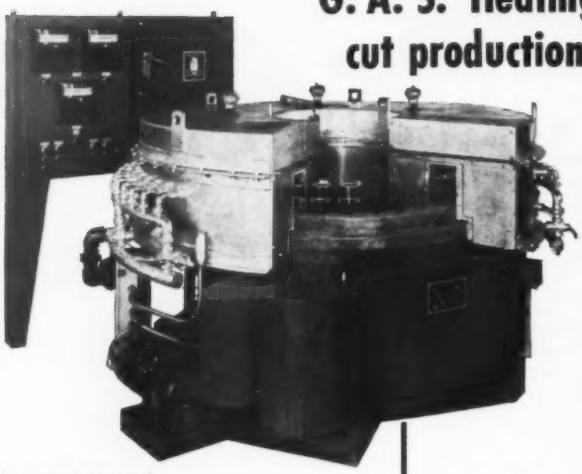
O-M Internal Key-type Air and Hydraulic Cylinders are available in a complete range of sizes (1½" to 8" bores) with standard or heavy-duty rods. Completely interchangeable parts and mounts. Immediate delivery on many sizes.

Mail Coupon TODAY *for Bulletins 101A (O-M Internal Key-type Air and Hydraulic Cylinders), and 105 (O-M Series T-H Heavy-duty Hydraulic Cylinders).*

ORTMAN-MILLER MACHINE CO
21 143rd Street, Hammond, Indiana
☐ Have representative call
☐ Send Bulletins 101A and 105
Name_____Position_____
Company_____
Address_____
City_____Zone_____State_____

CIRCLE INFORM-A-GRAM KEY NO. 1973

G. A. S. Heating Units cut production costs



in
Brazing
Soldering
Hardening
Annealing
Forging
and other
Production
Heating
applications

A typical example:

The G.A.S. Rotary Heating Unit, illustrated above, has substantially cut production costs for a well known electric motor manufacturer by doing in 4 minutes what formerly required 8 hours in a large furnace, and replacing a time consuming cold press operation. The unit is used for heating motor rotors to approximately 900°F., for "debonding" (separating aluminum core from steel laminations), and for "shrink fitting" shafts into them — 3 operations in one.

By combining High Speed Heating and Automation (or Semi-Automation), G. A. S. can take most any localized heating application and wrap it into one simple package.

Write for Bulletin 511

GAS APPLIANCE SERVICE, INC.
Industrial Gas Engineers
1936 Balmoral Avenue Chicago 40, Illinois

Representatives in Major Industrial Areas

CIRCLE INFORM-A-GRAM KEY NO. 1981

Gaertner Toolmakers' Microscope used to measure typical piece part. Co-ordinate range 4" x 2".

Precise measurement to 0.0001" and 1 min. of arc

Gaertner Toolmakers' Microscope

Here is a reliable, easy-to-use microscope for precise measurement of piece parts, tools, dies, thread gages, templates, jigs, fixtures, etc. Ideally suited for making a wide variety of precision measurements and is especially valuable in reducing rejects in production work.

With the Gaertner Toolmakers' Microscope you make direct, non-destructive measurements — no contact, no distortion, images are sharp and clear. It is a basic measuring instrument for inspection depts., gage labs, tool and die and model shops, industrial and research labs.

The Gaertner Toolmakers' Microscope has been proven in use by U. S. Government Gage Laboratories, and by prime contractors and their subcontractors. With all parties using the same measuring instrument, inspection procedures are co-ordinated and disagreements and rejects minimized.

Features that help you get
HIGH SETTING AND REPEATING ACCURACY

- Low, compact built-in rotary stage reads to 1 minute of arc throughout 360° range.
- Minimum overhang of stages.
- Full 2" precision-lapped lead screws with correction device.
- Straightforward, direct, uncomplicated optical system.

Features that assure you of
EASY, CONVENIENT OPERATION

- Independently rotatable cross hairs in protractor ocular speed up measurements, simplify measuring procedure.
- Convenient location of ocular eyepieces for ease of reading.
- Built-in transformer and plugs for all illuminators.

Modifications and accessories to
MEET YOUR EXACT REQUIREMENTS

- Thread and radius templates, camera and spotting attachments, fine motion focus, variable magnification available.
- If you have a special measuring problem, our staff of representatives will be happy to consult with you. The service and engineering facilities of the manufacturer are always immediately available to help you.

SEE IT AT BOOTH 426
ASTE TOOL SHOW
PHILADELPHIA • MAY 1-8

The Gaertner Scientific Corporation
1242 Wrightwood Ave., Chicago 14, Ill.
Telephone: BUckingham 1-5335

CIRCLE INFORM-A-GRAM KEY NO. 1985

MILWAUKEE *Precision* EQUIPMENT

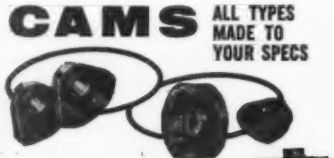
Designed and finished for true dimensional accuracy. Highest grade semi-steel.
Catalog sent upon request.

SURFACE PLATES — ANGLES — PARALLELS — STRAIGHT EDGES

J. C. BUSCH COMPANY *Engineers & Machinists* SINCE 1907
175 S. BARCLAY ST.
MILWAUKEE 4, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1982

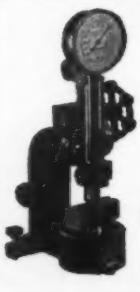
CAMS ALL TYPES MADE TO YOUR SPECS



Dr. Chas. Eisler ME, Founder
Chas. Eisler, Jr., Pres.

EISLER ENGINEERING CO., INC.
732 SO. 13TH ST. NEWARK 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1983

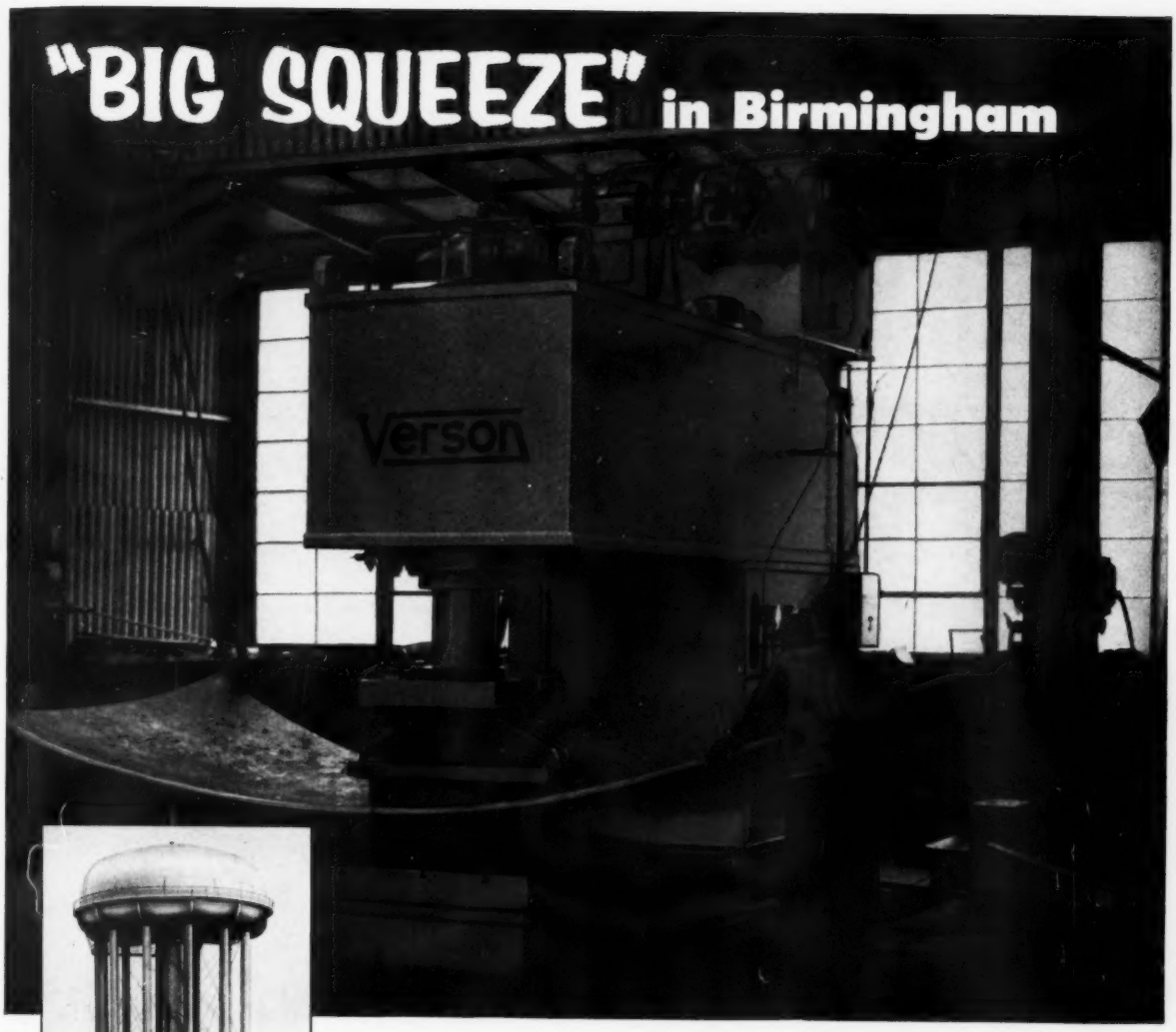


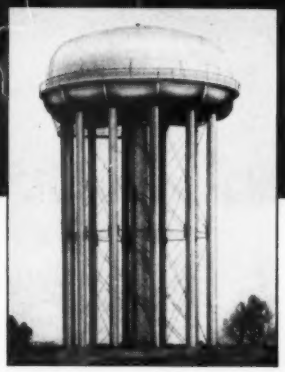
HARDNESS TESTING
has been done with the **SCLEROSCOPE**
Since 1907

THE SHORE INSTRUMENT & MFG. CO., Inc.
90-35 Van Wyck Expressway
Jamaica 35, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1984

"BIG SQUEEZE" in Birmingham





200 ton Verson Press dishes steel plate for storage tanks at Hammond Iron Works

Do you put the "Big Squeeze" on metal? Here's how Hammond Iron Works does it at their Birmingham, Alabama, plant. This recently installed 200 ton Verson Hydraulic Flanging Press dishes heavy steel plate for the wide variety of storage tanks manufactured by Hammond.

Gap depth is 72″ (from centerline of cylinders to back of frame), more than ample for a work piece such as this section for a radial cone elevated water tank. The press has a fast advance speed of 388″ per minute; pressing speed, 38″ per minute; and fast return speed, 520″ per minute.

The down-acting cylinder has a 36″ stroke; the bed liftout cylinder, a stroke of 18″. Ram area is 30″ x 30″ and the bolster is 60″ x 60″.

Big job . . . small job . . . if it concerns the press forming of metals, come to Verson. Here a press is more than just a press . . . it's a production process, engineered and built to provide greater efficiency and production with higher profit potential. Put Verson's production know-how to work for you. Write or phone, today.

173C

A Verson Press for every job from 60 tons up.

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9335 S. KENWOOD AVENUE, CHICAGO 19, ILLINOIS • 8300 S. CENTRAL EXPRESSWAY, DALLAS, TEXAS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

CIRCLE INFORM-A-GRAM KEY NO. 199

HUEBNER PUBLICATIONS, INC.
1975 Lee Rd., Cleveland 18, O.

FORM 3579 REQUESTED

HARDINGE
ELMIRA, N.Y.

MASTER COLLETS and PADS for
MULTIPLE SPINDLE AUTOMATICS

HARDINGE Style "S" Master Collets and Pads

The Only Master Collet with no Work Pressure on the Screw

Carried in stock for prompt delivery in:

Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles,
Minneapolis, New York, Oakland, Philadelphia, St. Louis, Toronto and Montreal

r
CS
ls